FAA AviationNews
AVIATION SAFETY FROM COVER TO COVER
SEPTEMBER/OCTOBER 2003

Fiesta 2003

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FAA AviationNews

AVIATION SAFETY FROM COVER TO COVER

VOLUME 42 · NUMBER 5

FEATURES

1 New Look for Airman Certificates
2 Dangers of Ballistic Parachutes to First Responders
9 32nd Albuquerque International Balloon Fiesta® 2003
13 How Low Can I Go?
16 The Final Phase
24 Size Matters
32 NTSB Propeller Warning Becomes an AD

DEPARTMENTS

4 Calendar of Events
26 Tales of an ASI — I Remember When...
27 Famous Flyers: Leonardo da Vinci
29 Runway Safety Corner:
Runway Incursions — How Pilots can Prevent Them
33 Aviation Maintenance Alerts
34 FlightFORUM
35 AvNEWS
IBC Editor's Runway

FRONT COVER: Launching of the America's Challenge Gas Race. (Mario Toscano photo)

BACK COVER: A Cessna Citation CJ2 in flight. (Cessna Aircraft Co. photo)

NEW LOOK FOR AIRMAN CERTIFICATES

FAA began issuing new, security-enhanced airman certificates July 31 to the nation's 650,000 active pilots. FAA Administrator Marion C. Blakey unveiled the new certificate before hundreds of aviation enthusiasts at the Experimental Aircraft Association (EAA) AirVenture.

The new, durable credit card-sized certificates are made from high-quality composite polyvinylchloride (PVC) media card stock and incorporate new security features, such as a hologram of the FAA seal, micro printing, and ultraviolet ink printing. They will replace the existing paper airman certificates, which can be easily damaged.

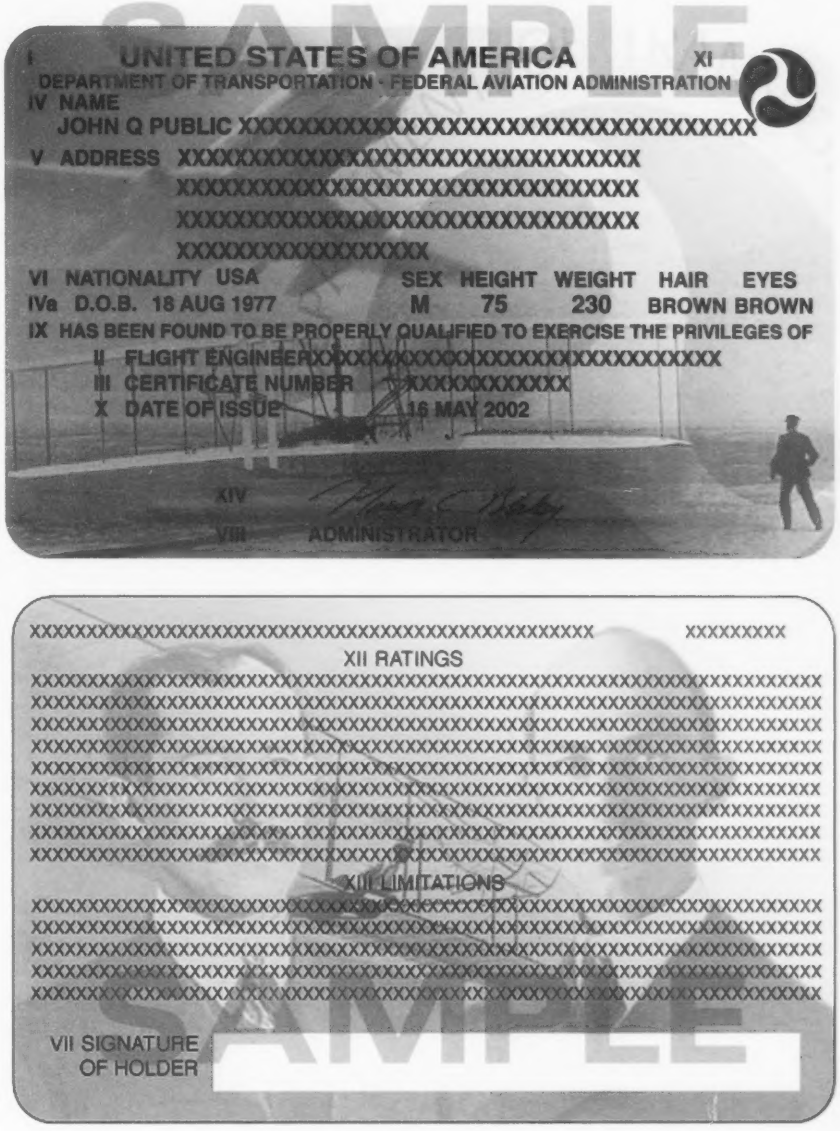
"The new certificate's durability and features will further protect pilot identities and add one more element of security to our aviation system," said Blakey.

The certificate will be issued to all new and existing airmen as they achieve higher certificate levels or additional ratings. It will also replace certificates that have been lost or damaged. The "old style" certificate is still valid. However, it is expected that all active airmen will be able to replace their certificates over the next three to four years.

In keeping with this year's Centennial of Flight celebration, the new certificate features graphics of the Wright brothers, the 1902 Wright Glider, the 1903 Wright Flyer, a Boeing jet aircraft, the DOT seal, and a hologram of the FAA seal. The Wright Family Fund provided images of the Wright brothers.

The new certificate was designed by the FAA's Civil Aviation Registry, part of the agency's Flight Standards Service. The Registry issues approximately 246,000 airman and 70,000 aircraft certificates annually.

If you have any questions, contact either the FAA's Certification and Flight Training Branch, AFS-840, at (202) 267-8196 or the Airman Certification Branch, AFS-760, at (405) 954-3822.


SAMPLE
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V ADDRESS XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
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II FLIGHT ENGINEER XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
III CERTIFICATE NUMBER XXXXXXXXXXXX
X DATE OF ISSUE 16 MAY 2002
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VIII ADMINISTRATOR
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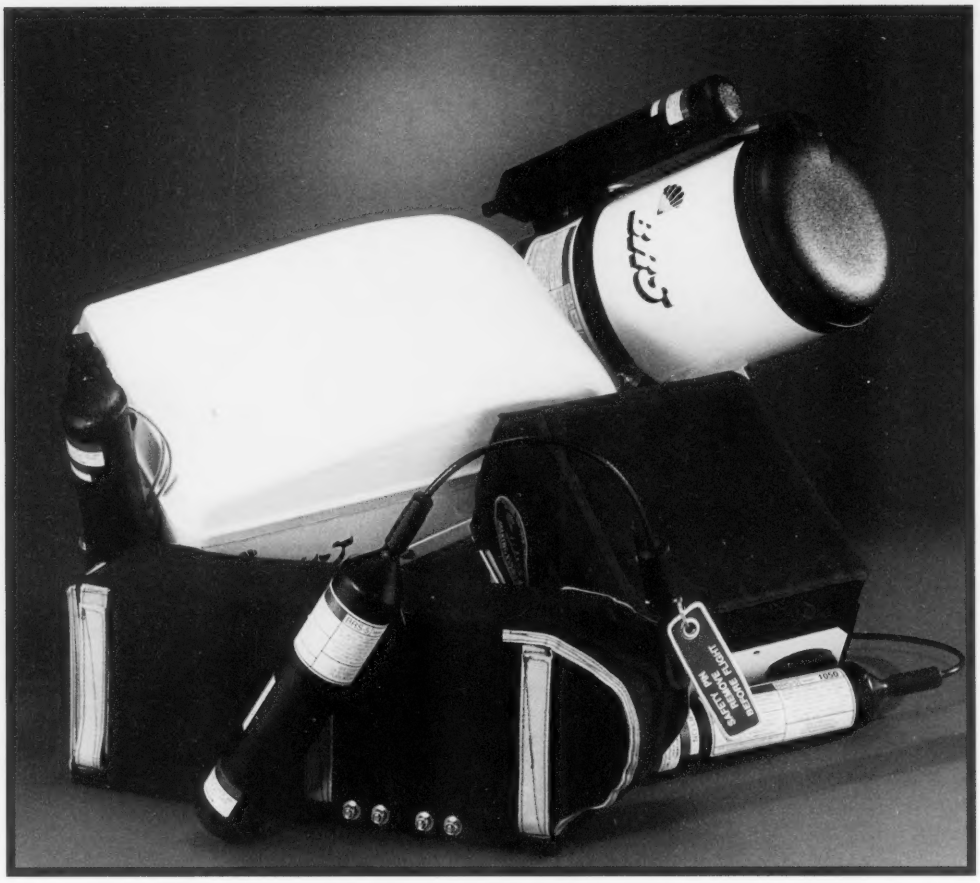


Dangers Of Ballistic Parachutes To First Responders

by Judi Palmer

Editor's Note: The following article is part one of a two-part series on pyrotechnics and aircraft. This first part is based upon a safety recommendation submitted to FAA Headquarters by FAA Aviation Safety Inspector Judi Palmer. She submitted the report after an accident she helped investigate in Georgia. Because of the potential risk she identified, FAA Aviation News, in cooperation with one of the largest manufacturers of emergency ballistic parachutes, is publishing the following information in the interest of safety. This information is especially important for first responders, such as medical and crash-rescue personnel, who may be the first ones at the crash site of an aircraft or ultralight vehicle equipped with an emergency ballistic parachute. The magazine wants to acknowledge Ballistic Recovery Systems Incorporated's (BRS Inc.) permission to reprint its safety information taken from its Internet web site.

Most FAA aviation safety inspectors do not look forward to the obligatory weeks of accident standby assigned by their Flight Standards District Office management. When the telephone rings on a stormy evening you can only expect the worst. However, the Southern Region's Operations Center personnel are always helpful, providing teleconference calls, sheriff and rescue coordination, and as much information as possible to the weary inspector assigned to investigate an accident.

The early May 2003 evening was no exception. The cheerful Operations Center Coordinator called to provide me with the preliminary report of an "ultralight vehicle" that had crashed in a remote area in northern Georgia. Relieved that it was an ultralight, I called my supervisor to report the preliminary report and expected him to say, "We don't do ultralights." To my surprise he said go up there tomorrow and make sure it is an ultralight.

The smallest aircraft I have ever set foot on was probably a DC-6. My specialty and title is Aviation Safety In-

First responders need to look for any type of warning on objects attached to an ultralight vehicle's airframe. In this accident, the ultralight vehicle has a more open airframe design than some other types of vehicles, so the ballistic parachute is more obvious.

spector/Cabin Safety. My expertise is large, Title 14 Code of Federal Regulation Part 121 air carrier type aircraft, which carry passengers, crewmembers and sometimes even pretzels and soda pop. The only thing I thought I knew about ultralights was that they didn't have an "N" registration number.

When I called the Operations Center back to tell them I would be investigating the accident the following day, the Operations Coordinator added some new information. He said the sheriff's department had called and said the "dang thing was exploding." Great, I thought, now we have some sort of hazardous material, or worse, terrorists in ultralights. It was starting to sound like something from a James Bond film.

I was able to talk an airworthiness inspector in being a fugitive from the FSDO cubicle police for a day to assist me in the north Georgia mountains with this ultralight adventure.

With flash flood watches in effect, lightening, and unending rain, the weather was grim as we approached the scene. The sheriff's department dispatcher greeted us warmly and proceeded to track down our escort. She also excitedly described the "explosion from the night before and added that the rescue workers were very lucky."

A very helpful deputy led us to the accident. We noted the event took place just feet from a child's swing set and back-yard playground. The deputy, who had been on scene with the fire and rescue personnel, described some sort of rocket that was accidentally fired when rescuers tried to remove the injured pilot from the two-seat "aircraft." The rocket narrowly missed one of the rescuers and hit the second rescue worker causing him to tumble down a small embankment. They conjectured that his heavy clothing protected him from seriously injury.

I looked at my fellow inspector who said, "It must be a ballistic parachute." I asked him to repeat what he just said, and he described some sort of device that launches a parachute that can save a hapless pilot from certain in-flight disasters. I asked him what part of training this was in and after a moment's thought, he said, "It was in an airworthiness class."

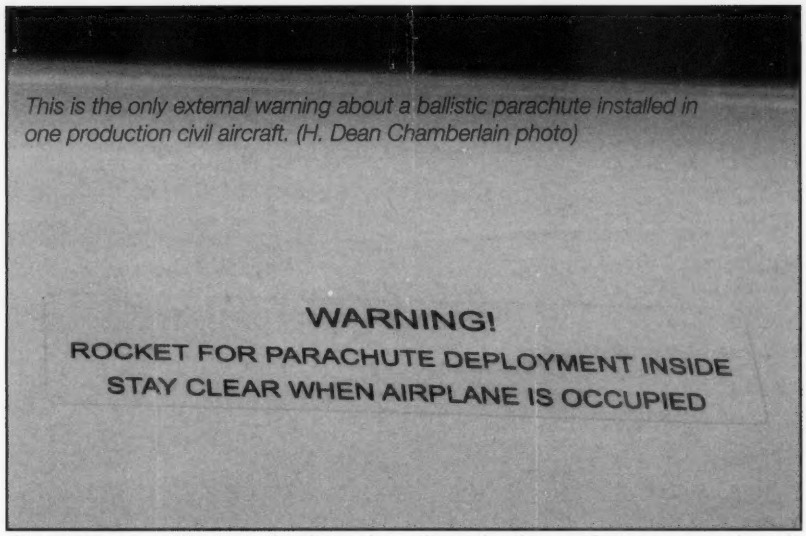
Just great, I thought. I wondered how many other inspectors and fire-rescue personnel were unaware of the potential danger of these devices. We found the canister, twisted under the wreckage that had housed the rocket. A placard stated it could cause death or serious injury. Of course that is if

you find it before it finds you. The way this device was situated in the damaged aircraft, any attempt to remove an injured occupant, or in fact, try to test control cables could have started the ignition sequence.

Upon returning to the office, I queried other inspectors about any knowledge they had on this device. Not one air carrier operations inspector, and only a few General Aviation operations inspectors had any knowledge of this sort of device. This article is one way to alert all inspectors to the dangers possible when working on an aircraft to which a ballistic parachute device has been fitted.

The term ballistic, according to the manufacturer, has nothing to do with guns or ammunition; instead it refers to a means of extracting a parachute. How dangerous are they? The rocket motors used by the manufacturer can accelerate to over 100 miles per hour in the first one tenth of a second after ignition. While the total firing period is only one second, someone in the path of an escaping rocket could be seriously injured or killed.

Pulling a blast handle in the cockpit activates the rocket motor. In an aircraft accident, things do not often end up the way they started. The activation housing of the ballistic parachute may become stretched tight. If the parts separate enough, the unit could be detonated even with the blast handle still secured by its safety pin.



This is the only external warning about a ballistic parachute installed in one production civil aircraft. (H. Dean Chamberlain photo)

This article is an attempt to alert other inspectors and first responders on the potential danger of these devices. More information can be found at the BRS Inc.'s web site: <http://brsparachutes.com>. Specifically of interest is the SAFETY heading with information for EMERGENCY PERSONNEL.

Fortunately, for those of you reading this article and taking the time to research this product, your accident investigation or first response hasn't happened yet. I hope it never does. But if and when it does, maybe you will be a little safer because an inspector cared enough to follow up with a safety recommendation and this resulting article in the *FAA Aviation News*. I want to confirm the FAA's Safety Recommendation program works. This article proves it. Stay safe.

Judi Palmer is an Aviation Safety Inspector on the FAA's Certification, Standardization, and Evaluation Team (CSET) in Atlanta, GA.

CALENDAR OF EVENTS

September 27 First Annual Pancake Breakfast Fly-In, Savannah, GA

From 7- 9 a.m. is the pancake breakfast, 8a.m. to noon pilot education forum, and 12:15 to 1 p.m. hangar talk at the Savannah Hilton Head International Airport's "Old Executive Hangar." For more information call (912) 964-1557.

September 20 – 21 Aviation Heritage Festival, Nashua, NH

Daniel Webster College is sponsoring this event at Nashua Airport, featuring 25 vintage airplanes, distinguished guests, seminars, and aviation exhibits sure to educate, excite, and entertain people of all ages. For more infomraiton call (603) 577-6624 or visit their web site at <www.dwc.edu/festival>.

October 26 Third Annual Wings, Wheels, Rotors, & Expo, Los Alamitos, CA

This event at Los Alamitos Army Airfield (KSI) features both fixed and rotary winged military and civilian aircraft in static display and/or flybys, combined with several hundred vintage and classic automobiles. For more information call (562) 598-6659 or visit their web site at <www.wwrexpo.com>.

ROCKET-DEPLOYED PARACHUTES ON CIVILIAN AIRCRAFT MAY POSE HAZARD TO EMERGENCY PERSONNEL

An emergency call takes you to the scene of an aircraft accident. Victims inside may be injured. You want to act quickly but people at the scene warn you about a rocket-deployed parachute installed on this airplane. The pilot did not activate the safety device and now you may find yourself working on or near the airplane with its ballistic device still ready to fire.

What do you do? You want to help the victims, but you don't want to hurt yourself or others around you.

Perhaps the occupants escaped without serious injury. They may have left the plane. But a damaged aircraft with a ballistically-deployed parachute can be lethal. What do you do?

Airplane crashes are rather rare events, thankfully. This proves these vehicles, whether airliners or recreational sport planes, are quite safe when flown by competent pilots.

However, the rare nature of these crashes also means that those who arrive first at the scene of an accident (rescue workers, investigating officers, fire fighters, and other safety personnel) may not recognize the parts of the aircraft particularly well.

One device rescue workers may encounter is a rocket-deployed emergency parachute system (sometimes called a ballistic parachute). While these devices are intended to save lives, they have the potential to cause injuries or even death to rescue workers.

In the hope of preventing such tragic results, this article attempts to provide vital information to emergency personnel.

What Does "Ballistic" Mean?

The term ballistic in this reference has nothing to do with guns or ammunition. Instead it refers to a means of extracting a parachute. For Ballistic Recovery Systems (BRS) today, this means a rocket-deployed emergency parachute system. The term recovery has nothing to do with recycling ammunition, but instead means bringing a payload to the ground via parachute canopy.

Used as intended, these BRS-brand emergency parachute systems have saved over 150 lives.

More correctly stated, they save lives if used. However, the pilot must elect to deploy the system, completely different than, say, an airbag which deploys automatically when certain conditions develop. Because the pilot (or his passenger) must pull the activating handle, sometimes the units are not used.

The pilot may have felt he could rescue the plane from its predicament. Or he may have been unable to deploy for physical or other reasons. Regardless of why a ballistic parachute was not used, the fact remains for safety personnel that when handling an accident where a BRS unit was not deployed, a potentially dangerous device now confronts them.

How Dangerous Are They?

The rocket motors used by BRS to extract its life-saving parachutes can accelerate to over 100 mph in the first tenth of a second after ignition. While the total firing period is only one second, someone in the path of an escaping rocket could be seriously injured or killed. These are powerful little

rockets (about one and a half inches diameter and 10 inches long) that work very efficiently.

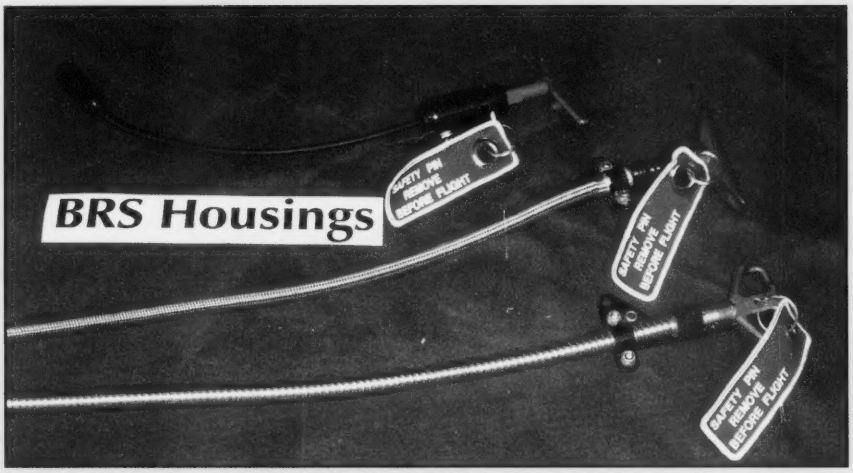
The rocket motors are activated by pulling a blast handle in the cockpit. Both parachute container and handle should be permanently fastened to the aircraft. However, in an accident, things come apart. Should the sections of an airplane be broken apart, the activating housing may become stretched tight. If the parts separate enough, the unit could be detonated even with the blast handle still secured by its safety pin.

The danger to safety personnel may now be more obvious. A rescue worker who disregards the position of the ballistic parachute system, or who moves the aircraft without determining the existence of a ballistic parachute system may put him or herself in considerable jeopardy.

BRS staff members have worked with several National Transportation Safety Board people as well as rescue personnel at airshows in Florida and Wisconsin. BRS company employees have assembled some information for safety personnel to disarm these systems.

When an accident happens, emergency personnel may need to call for assistance.

Fortunately, those of you reading this article have the luxury of time to respond. The accident has not yet occurred. Given enough time, BRS has a simple solution to offer. First, we need to provide a little background information.



What Does A BRS Unit Look Like?

A BRS unit is comprised of four major elements.

The first thing emergency people will see may be a red firing handle. This will usually be located near the victims as it should be close to the pilot so it can be operated. The red firing handle will connect to an activating housing, an armored yet flexible shaft that links the firing handle to the parachute.

The second part is the parachute container itself. This is probably a white-painted aluminum canister about 6-8 inches wide and 15-25 inches long (depending on the size parachute packed inside the container). The parachute may also be housed in a fabric covering called a softpack, or in a fiberglass box. The location of this parachute and container varies by the aircraft but will always be at the opposite end of the activating housing from the firing handle.

The third component is the potentially dangerous part: The rocket motor (or other ballistic device). The rocket motor has been used since 1987, so it is increasingly unlikely that emergency personnel will examine the older systems. However, like the rocket motor, all ballistic devices which are used to extract the parachute with great speed will be located very near the parachute. For engineering reasons, the parachute and ballistic device should be near one another.

On some airplanes the parachute and its ballistic device will be mounted on top of the aircraft; in other cases, they are toward the lower side of the fuselage. In most cases, they will be near the surface of an enclosed aircraft.

It is important to observe at this time that the elements described above may no longer be in the same relation to one another after the aircraft has crashed.

The final items that make up a BRS are mounting hardware and attachment bridles which connect parachute to aircraft. Since these are not in the least hazardous, we'll ignore them.

Connecting the firing handle

to the rocket motor is a housing, the purpose of which is to protect an internal stainless steel cable against binding or jamming. The activating housing itself does nothing but protect; it is the cable inside this housing that detonates the rocket motor.

The housing on BRS units has changed over the years. The material used to be a flexible, strip-wound, bright silver metal tube of about a half-inch diameter. Later this became a braided material similar in appearance and size, except that the exterior is made of many small wires braided together. The newest models use a black plastic exterior that resembles a bicycle brake housing except that it has a slightly larger diameter.

The housing joins the firing handle on one end to the rocket motor on the other. Pulling either end away from one another can detonate the unit. Normally the handle and the parachute unit will be mounted securely, but as stated above, in an accident positions may change. Rescue workers, police officers, and fire fighters should exercise extreme care when working around these devices, especially if the airplane is broken into parts.

The rocket motor should* always be aimed away from the aircraft, commonly toward the rear, upwards or down-

wards, and sometimes toward the side of the aircraft. Every one tends to be different as most aircraft are designed differently. (* the aiming of the motor may be affected by the accident and it may no longer be aimed as advised by BRS)

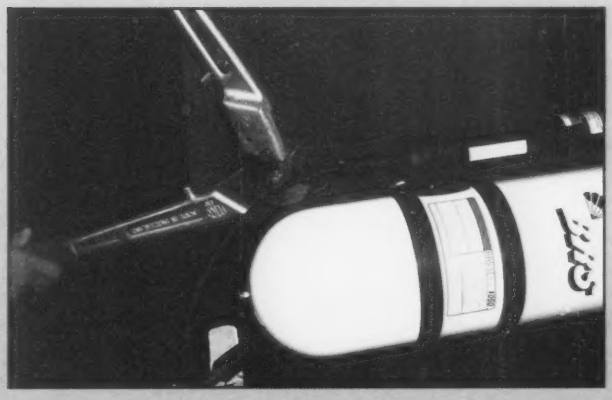
Rescue personnel should first determine the existence of a BRS-brand unit. You can scan for a company logo, often placed on the outside of the aircraft. Or you can look for the unit itself. These containers, which hold the parachute canopy, will always have a company logo on them. A few other brands exist but overwhelmingly, these units will be the BRS brand name.

Alongside the parachute container will be a 2-inch black or white tube about 12 inches in length. This is called the launch tube and it contains the rocket motor. A rocket motor consists of two principle parts: The launch body, which will leave the launch tube when fired; and the igniter or trigger, which remains in the launch tube after detonation. The launch tube on newer units is covered with a plastic cap while on older models it remained open so you could see the business end of the rocket motor.

The open end or the cap-covered end of this black or white launch tube is the exit point of the rocket motor and therefore this is the dangerous end. Under no circumstances should rescue personnel place any part of their person in front of the departure end of the launch tube.

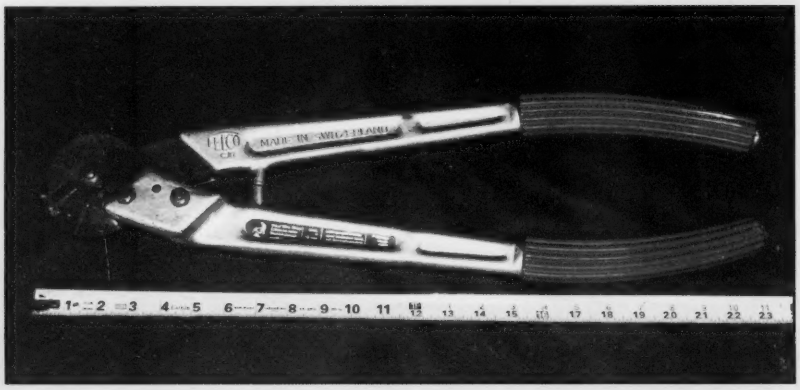
Solution: Cut the Housing

The rocket motor is NOT an armed, hair-trigger device. It requires a deliberate pull of about 30-40 pounds to cock and fire the system. Both cocking and firing are accomplished by one pull of the handle. While customers are told to pull about one foot, in fact the system needs only about one-half inch of movement at the trigger to detonate. Some extra slack is built into the system to allow for easier mount-



ing but once the wire inside the housing is drawn tight, only an additional half-inch of movement is needed to fire the rocket.

The housing attaches on the launch tube at the opposite end of the rocket's exit. This is a tapered end with a screw thread onto which the housing is fitted. After you locate this part of the rocket motor, you are ready to act.



BRS STRONGLY RECOMMENDS using a Felco-brand C.16 cutter (part number 39601-63-00). This can be obtained from various sources and BRS will soon be able to sell these directly to law enforcement, rescue organizations, fire departments, or other emergency personnel. It is also available from Sanlo Manufacturing Co. (219-879-0241).

Please note: DO NOT ATTEMPT TO CUT THE HOUSING WITH AN ORDINARLY BOLT CUTTER!

A bolt cutter is NOT effective at cutting the housing as it tends to squeeze the housing out of its grip. The Felco-brand cutter gathers the housing and cuts rather thick cables with surprising ease. The tool sells for about $225 plus shipping and would make a worthy addition to any rescue organization's standard tool box. It has proven useful for cutting fences, steel cables, and other obstacles which may prevent workers from reaching the scene of an accident. The cutting edge can be replaced if worn.

With the Felco-brand tool and after finding the launch tube base, workers can simply cut the housing, including the activating cable inside, near the base of the rocket launch tube where the housing screws on the launch tube. Although the Felco-brand cutter can slice through the housing and cable with ease, care must be taken not to twist the housing while cutting it, as this may have the effect of pinching the cable inside and possibly pulling it enough to fire the rocket motor.

Once the housing is cut, the system is relatively harmless and rescue workers should have no further danger handling the accident victims or aircraft wreckage.

After removing victims to safety, workers are advised to remove the rocket motor and to completely disarm it by removing the rocket fuel, and firing the igniter. BRS is also able to provide assistance to this purpose, but this is not time critical once the activating housing has been removed. Advice on this subject can be obtained by calling BRS at (651) 457-7491 during regular business hours

Summarizing

The following summary provides the minimum steps to disarm a BRS rocket motor.

1. Locate the BRS parachute system by finding the parachute (see photo of container types on page 5). NOTE: Keep in mind that a badly broken apart airplane may have already put the activating housing into a stretched state that may be close to detonation.
2. Identify the rocket motor launch tube. Note where the activating housing screws onto the base of the launch tube.
3. Using a Felco-brand cutter, cut the activating housing at the base of the launch tube where the activating housing screws onto the launch tube.
4. Remove the still-live rocket motor to a secure place and contact BRS for further directions about permanently disabling the rocket motor.

Second Method

It is also possible to disconnect the activation housing on many BRS units using BRS Drawing 600 or Drawing 610 under the Technical Information section. (Internet address below)

A Disclaimer

While the advice above should prevent problems for safety personnel in most situations, the instructions given apply to BRS brand products only. BRS dominates the U.S. market with 80% or more of all so-equipped aircraft. However other brands called Pioneer, Second Chantz, Advanced Ballistic Systems, Galaxy, or GQ Security have been sold in the past. While these systems are similar, they are not identical. BRS cannot provide positive information on how to disarm these systems.

This safety information originally appeared in the <www.brsparachutes.com> web site and was reprinted with permission from Ballistic Recovery System, Inc.

32nd Albuquerque International Balloon Fiesta® 2003

story and photos by A. Mario Toscano

Albuquerque, New Mexico is ready to stage its 32nd International Balloon Fiesta® from October 4 to 12, 2003, anticipating the participation of more than 750 hot air and gas balloons. The 8th America's Challenge Gas Balloon Race – qualifier for U.S. participants in the Gordon Bennett's Race – is scheduled to launch at 6 p.m. on Saturday, October 4th.

Considered the world's largest ballooning event, the Albuquerque International Balloon Fiesta® is managed by a volunteer Board of Directors made up of 23 members. Art J. Swenka is this year's president.

Last year's (2002) Fiesta registered 722 balloons. A total of 79 special shapes balloons flew in Fiesta 2002, and an estimated 836,770 people visited Albuquerque's Balloon Fiesta Park during the nine-day event. Sixteen gas balloons participated in the event.

Balloons from 38 American states and 22 foreign countries also participated in last year's event. The first prize in the overall hot air balloon competition was awarded to Minnesota pilot Wynn Gustafson. The team of Richard Abruzzo and New Mexico Governor Gary Johnson won the 7th America's Challenge Gas Race. The 3rd Annual New Mexico Challenge hot air balloon race registered winners in three different categories. Bill Glen of New Mexico won the Key Grab Competition.

7th AMERICA'S CHALLENGE GAS RACE

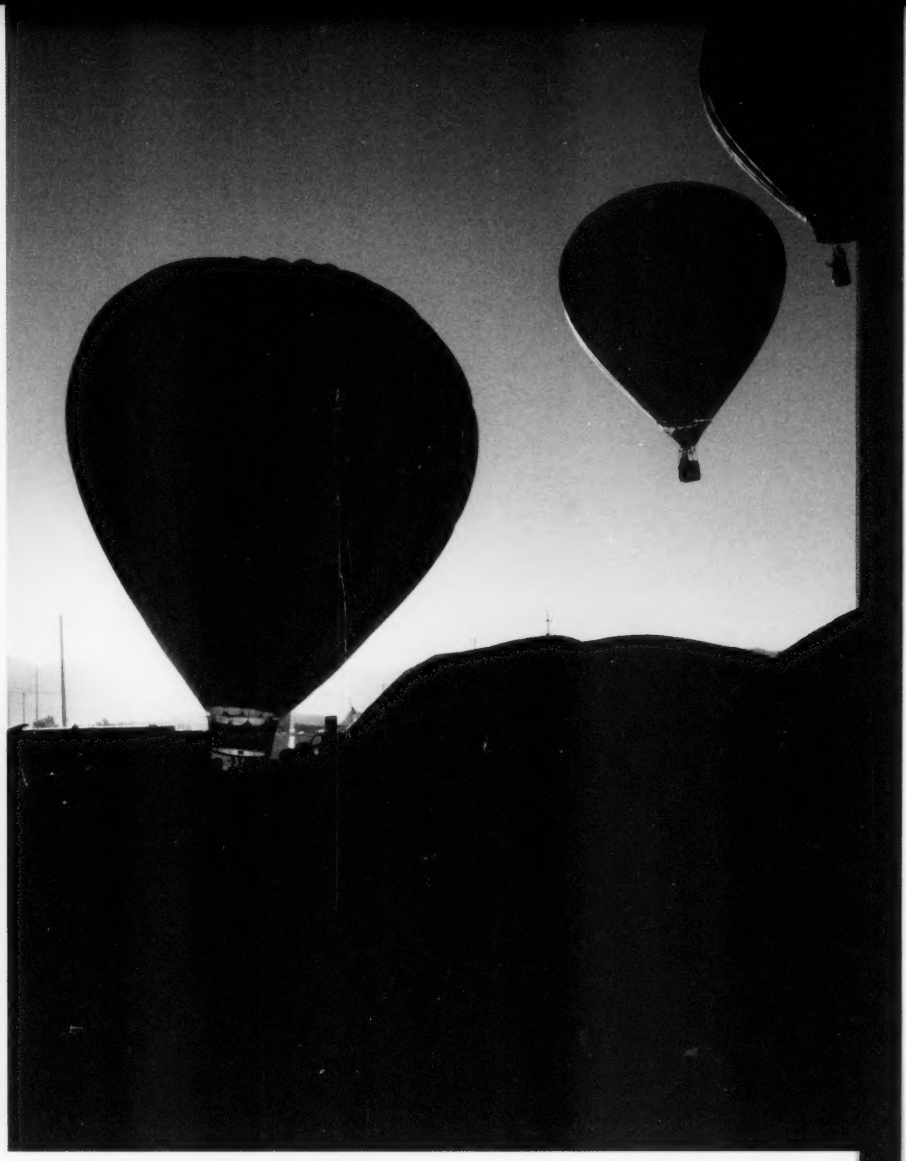
U.S. pilots Richard Abruzzo and New Mexico Governor Gary Johnson landed in Georgetown, Delaware, and logged 1,738.11 miles to win the 7th America's Challenge Gas Balloon Race in 43.13 hours. The U.S. team of Louis Vitanza and Bert Padelt was second, landing in Sissonville, West Virginia with 1,398.55 miles in 35.58 hours. The U.S. team of Mark Sullivan and Cheri White placed third with 1,310.55 miles by landing in Homer, Georgia, and the U.S. team of Frank Wechter and Thomas Boylan finished fourth. Sixteen gas balloons partici-

pated in the event.

Sullivan's and Wechter's teams have the race's new records for flight duration, while Abruzzo and Johnson's flight is the second longest in the history of the America's Challenge race. It is expected that the three top U.S. teams in the America's Challenge race will represent the United States this September in the world's most prestigious gas balloon race Coupe Aeronautique Gordon Bennett. The 47th edition of this race is scheduled from September 12 to 20 in Arc-et-Senans, France.

The Education Committee of the Albuquerque Aerostat Ascension Association (Quad-A), as it customarily does before each gas race, held a special "Fiesta Safety Seminar" for all participating teams. FAA's Albuquerque Flight Standards District Office, Air Traffic Control, and Automated Flight Service Station personnel presented pertinent information on charts, Air Traffic Control Centers, communications, weather, and flight services among the several topics related to the safety of the race.

The Quad-A web site is a "must-visit" for balloonists. In addition to downloadable material such as prohibited zones (PZ), area maps, schedule of safety seminars, and the latest about Fiesta, <http://www.hotairballoning.org> provides valuable links to its visitors.



FAA's "TEMPORARY FLIGHT SERVICE STATION"

The FAA Albuquerque Automated Flight Service Station (AFSS) is scheduled to return for a third year in providing its online and live services directly to the pilots and crews participating in Fiesta 2003.

Last year, Operations Manager Thom Ochello, Jr., had his crew set up a "Temporary Flight Service Station" in the pilots' tent, and each Fiesta day they answered questions, provided maps, projected looping weather graphics on a wide screen, and held pilot briefs upon request.

Albuquerque AFSS personnel also staffed the America Challenge Gas Balloon Race Command Center to provide weather and aeronautical information to race contestants and officials as contenders flew across the United States.

The FAA Albuquerque AFSS direct support of Fiesta includes general information, automated services, frequencies, weather patterns, flight planning, and pilot briefings. Available maps include the New Mexico topography, weather reporting locations, airspace classification, area AFSS and Air Traffic Control frequencies, Airways-Jet routes, IR/VR routes, and restricted areas. Many of these products are also available through the Albuquerque AFSS web site at <www.abqafss.jccbi.gov> and for a weather brief over the phone you can call 1-800-992-7433(1-800-WX-BRIEF).

THE FSDO IN THE PILOTS AND CREW TENT

The Albuquerque Flight Standards District Office is also scheduled to have its customary remote facility in the pilots and crew tent at Balloon Fiesta Park.

The FAA has the responsibility to review the certificates and currency of all participating pilots, as well as each entrant's balloon's airworthiness. Just like airplane pilots, balloon pilots must

also meet Federal requirements for certification. Balloons must be inspected for airworthiness every year or every 100 hours of flight time if flown for hire.

FAA J.D. Huss, an aviation safety inspector with the Albuquerque FSDO, is 2003 Fiesta's designated inspector in charge (IIC). In addition to managing the FAA booth from where he ensures that all FAA requirements are met, Huss addresses last minute issues to ensure that Fiesta events are safe for participants and all spectators. To help Huss manage the large workload during Fiesta, the FAA selects and sends several inspectors from neighboring FSDO's to augment the FAA's temporary "office" at Fiesta Park.

...AND, NOW, IT'S FIESTA TIME!

Albuquerque is geared up for the first Saturday in October. With the first Dawn Patrol, scheduled at 5:45 am, balloon enthusiasts begin nine days of exciting events with daily mass ascensions and balloon flying events. The 8th America's Challenge Gas Race lift off is scheduled for Saturday, October 4, at 6 pm.

From an inaugural mass ascension to the farewell mass ascension, the gas and hot air balloon races, evening glow spectacles, and special shapes ascensions, Albuquerque International Balloon Fiesta® is considered the largest and most photographed ballooning event in the world. In addition to the thousands of spectators who visit Fiesta Park each year, millions see the event on television segments worldwide.

Safety in ballooning and in Fiesta Park during operations cannot be over-emphasized. It is FAA's primary mission as it is Fiesta Event Director Pat Brake. Brake instills in all her volunteers—more than 2,000 of them each year—that safety is their foremost concern. The Albuquerque FSDO is publicly grateful for the "outstanding job" that Brake's team does in keeping Fiesta and Albuquerque's skies safe.

The FAA has succeeded in maintaining the highest safety record through the years at the Fiesta because of this genuine collaboration with the event organizers, their leadership, dedication, and responsibility. All participants are to be commended for it!

If you are a participating pilot or crew in 2003 Fiesta, drop by the FAA booth in the pilots' tent for an AFSS briefing, to see the FSDO team and get a free copy of *FAA Aviation News*, or just to say hello. You'll be glad you did, and so will we! +

Thanks to the Albuquerque FSDO personnel and to J. D. Huss, Fiesta IIC, for support and help in facilitating our coverage and report on Fiesta.

Ballooning ... ON THE WEB

Albuquerque Flight Standards District Office
http://www.faa.gov/fsdo/abq/abqhome.html

Albuquerque Flight Service Station
http://www.abqafss.jccbi.gov

Albuquerque Aerostat Ascension Association (Quad-A)
http://www.hotairballooning.org

Albuquerque International Balloon Fiesta
http://www.aibf.org
http://www.balloonfiesta.com

Federation Aeronautique Internationale (FAI - International Ballooning Commission)
http://www.fai.org/ballooning

Balloon Federation of America (BFA)
http://www.bfa.net

BFA Jr. Balloonist
http://www.bfa.net/jrbaloonist/index.htm

Balloon Life Magazine
http://www.balloonlife.com

North American Balloon Association
http://www.eballoon.com

GASBALLOON News
http://www.gasballon.be

The Albuquerque Gas Balloon Association
http://www.gasballooning.org

Coupe Aeronautique Gordon Bennett
http://www.gordonbennett2003.org

ALBUQUERQUE INTERNATIONAL BALLOON FIESTA

Balloon Fiesta Park, Albuquerque, NM
October 4-12, 2003

EVENT SCHEDULE

Saturday, October 4
5:45 AM Dawn Patrol Show
6:45 AM Opening Ceremonies
7:00 AM Mass Ascension
6:00 PM America's Challenge Gas Balloon Race

Sunday, October 5
5:45 AM Dawn Patrol Show
7:00 AM Mass Ascension
5:45 PM Balloon Glow®
8:00 PM AfterGlow™ Fireworks Show

Monday, October 6
5:45 AM Dawn Patrol
7:00 AM New Mexico Challenge Hot Air Balloon Race

Tuesday, October 7
5:45 AM Dawn Patrol
7:00 AM Flying Events – New Mexico Challenge

Wednesday, October 8
5:45 AM Dawn Patrol Show
7:00 AM Mass Ascension

Thursday, October 9
5:45 AM Dawn Patrol
7:00 AM Special Shape Mass Ascension
8:00 AM Flying Events
5:45 PM Special Shape Glowdeo™
8:00 PM AfterGlow™ Fireworks Show

Friday, October 10
5:45 AM Dawn Patrol
7:00 AM Special Shape Mass Ascension
8:00 AM Key Grab Competition
5:45 PM Special Shape Glowdeo™
8:00 PM AfterGlow™ Fireworks Show

Saturday, October 11
5:45 AM Dawn Patrol Show
7:00 AM Mass Ascension
5:30 PM Night Magic Glow
8:00 PM AfterGlow™ Fireworks Show

Sunday, October 12
5:45 AM Dawn Patrol Show
7:00 AM Farewell Mass Ascension

ALL TIMES AND EVENTS ARE WEATHER DEPENDENT
Please visit http://www.balloonfiesta.com for current schedule.

ALBUQUERQUE INTERNATIONAL BALLOON FIESTA
October 5 -13, 2002

FINAL NUMBERS
- Registered balloons: 722
- Total special shape balloons: 79
- Total gas balloons: 16
- Estimated spectators: 836,770
- Media organizations: 198
- Media representatives: 706
- States represented: 38
- Represented countries: 22

BALLOON COMPETITION WINNERS
- Richard Abruzzo and Gary Johnson won the 7th America's Challenge Gas Balloon Race.
- Wynn Gustafson from Minnesota was the overall balloon competition winner.
- Bill Glen from New Mexico won the Key Grab competition.
- New Mexico Challenge Hot Air Balloon Race results:
  - Bill Dimmitt and Sam Cabeza de Baca won the 83,000 cu.ft. and under;
  - Janice Sines and William Woodhead won the 90,000 cu.ft.: and,
  - Rene Meier and Mark Meyer won the 105,000 cu.ft.

How Low Can I Go?

by Franklin Li

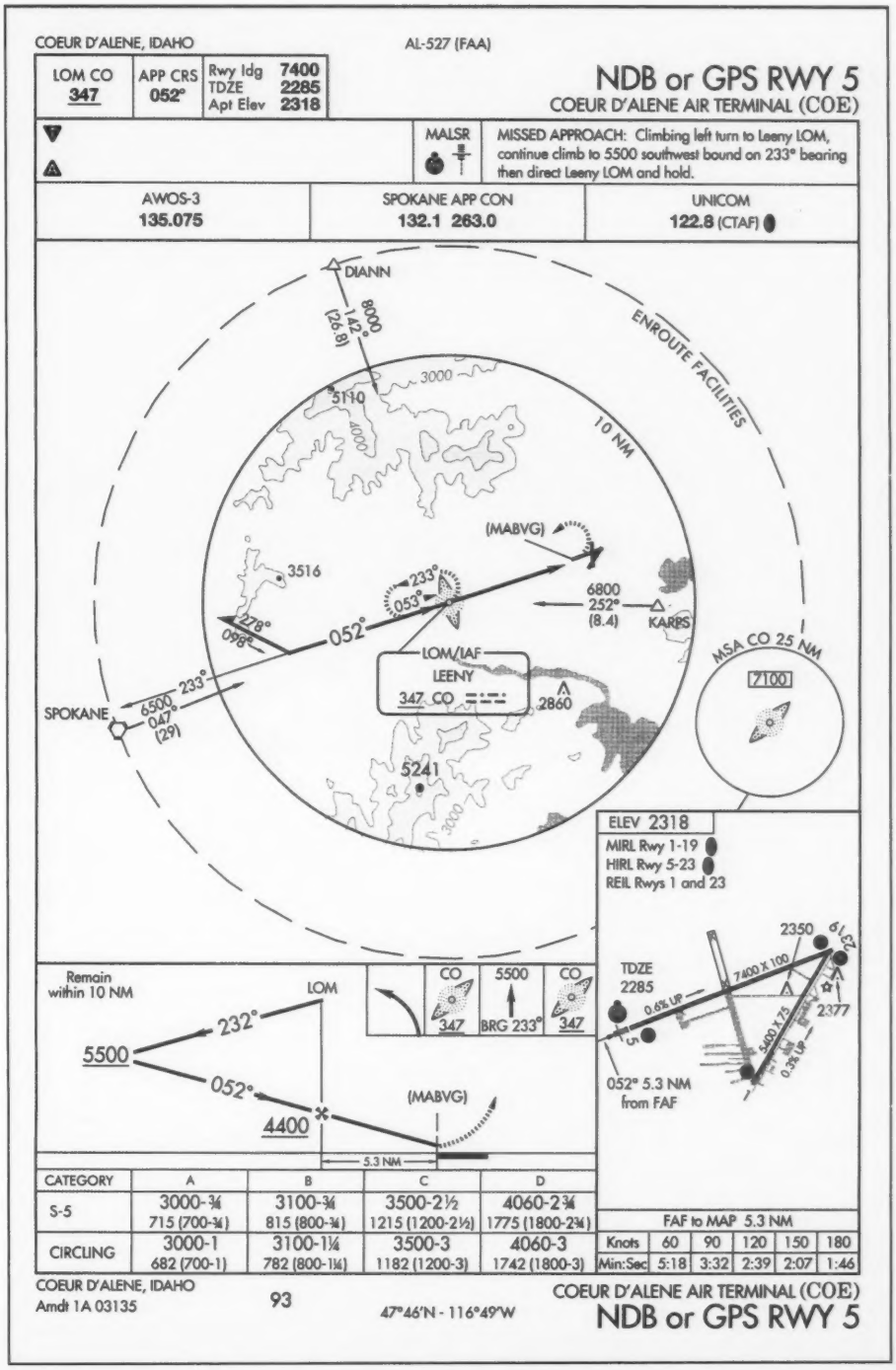
You are in a 1977 Cessna 172N taking your parents to a family reunion at your uncle's place in Coeur D'Alene, Idaho. You are a private pilot who recently received your instrument rating at a local FBO in Salem, Oregon, and have logged fifty hours of simulated instrument time, none in actual conditions.

Then you hear over the radio:

Cessna 1-2-3-4-5, eight miles from LEENY, cleared NDB runway five approach. Maintain maximum forward speed to help me sequence a Gulfstream.

Looking at the approach plate, you notice there are mountains around the airport with little room for error. The AWOS at the airport reports a 1,000-foot ceiling and two-miles visibility making this your first experience in actual instrument meteorological conditions. You decide you can safely keep your speed up at around 100 knots to help air traffic. As you approach your final approach fix, you decide to review your approach minimums. You ask yourself, "How low can I go?"

How do you determine your minimums? The published minimum descent altitude (MDA) for the non-precision NDB Runway 5 approach is 3,000 feet and 3/4 mile visibility for a Category A aircraft like you are flying. The circling minimums to Runway 5 are 3,000 and one mile visibility if



you had to circle to land.

But since you are flying the approach at 100 knots, which MDA listed should you use? Do you use the published minimums for your Category A aircraft or those for the next higher Category B aircraft since you are flying above the 91 knots threshold listed for approach Category B aircraft in the *U.S. Terminal Procedures* publication. How do you determine if you are to use Category A or Category B approach minimums? The difference is important. In this example using the Coeur D'Alene NDB or GPS RWY 5 procedure, the MDA for Category A aircraft is 3,000 feet and 3,100 feet for Category B aircraft. Your airplane is a Category A aircraft, but you are flying the approach in excess of 90 knots which is the upper limit for Category A aircraft. The difference between Category A and Category B minimums is 100 feet for this particular approach. Which MDA do you use for this approach? The closest FAA reference to help you decide is in the *U.S. Terminal Procedures* publication which states in part on page A-2:

An aircraft shall fit in only one category. If it is necessary to maneuver at speeds in excess of the upper limit of a speed range for a category, the minimums for the next higher category should be used. For example, an aircraft which falls in Category A, but is circling to land at a speed in excess of 91 knots, should use the approach Category B minimums when circling to land.

Based upon this recommendation, since you are flying the approach at 100 knots, you should use the approach Category B minimums. But is it mandatory for you to fly the approach using the Category B minimums? That is the question.

Before continuing any further, I want to clarify several myths about instrument approaches.

First, does *maneuver* refer to only circling approaches? No. A maneuver is not limited to turns. A descent is a maneuver as well. Also remember, an approach, such as a non-precision VOR approach to a runway, can be offset from the straight in approach course and still be considered a straight in approach. In the case of an NDB approach away from the NDB toward the airport, the NDB approach will take you to the general area of the airport rather than a particular runway. You may have to maneuver to your desired runway once you have the airport in sight.

Secondly, what is the significance of 1.3 V_{SO}? The airspeed of 1.3 V_{SO} is not the recommended speed to fly an instrument approach. To determine your aircraft's recommended airspeed, refer to your aircraft's owner's manual. It should also be noted that 1.3 V_{SO} is the minimum speed that should be used when flying an instrument approach. In everyday operations, however, an aircraft may fly an instrument approach at faster speeds due to other traffic or weather conditions.

When reading the procedures more closely, it states "the minimums for the next higher category should be used." When referring to Title 14 Code of Federal Regulations (14 CFR) §1.3 on the discussion of imperative and permissive verbs, "should" is not defined. Therefore, hypothetically, as long as the aircraft is a Category A airplane, you can push all 160 horses in the Cessna and fly a circling to land approach at 145 knots to Category A minimums although you *should* be using Category D minimums. Furthermore, when someone approaches you and asks why were you flying at the lower minimums, you can pull out the paragraph and tell them it is not mandatory that you fly the approach at the respective minimums when flying in Category B speeds, but try telling your passengers it is okay to use the lower minimums while possibly risking their safety by flying at the lower minimums.

The reason an aircraft flying at higher speeds should use the higher minimums is simple: obstruction clearance. The approach minimums were based on the speed of the aircraft. When operating at higher speeds, the operation needs a larger area for obstruction clearance due to the aircraft's increased turning radius; and the altitudes at the lower category may not provide the necessary wider area clearance. Furthermore, at faster speeds, the pilot has less time to react. Higher visibility and altitude minimums are necessary to allow the faster-flying pilot to have more time to see the airport, maneuver the aircraft, and configure the aircraft for landing or a missed approach as appropriate.

Also pilots need to consider the design errors allowed in various instruments. For example, an altimeter can be up to 75 feet off; your VOR receiver may be up to several degrees off course; the heading indicator may not be set to the current compass heading or it could be set a degree or two off; and your timing for this non-precision NDB approach may be a little off. Add in the need for correcting for some gusty winds in mountainous terrain, and you can begin to see the importance of using the approach minimums for the speed you are flying rather than the lower minimums for your specific aircraft if you are a Category A aircraft flying at Category B airspeeds.

So, even though the *U.S. Terminal Procedures* use the word "should" rather than "must" or "shall" when referring to aircraft operating at speeds above their respective categories, based upon all of the safety considerations involved in the design of an approved terminal procedure, it is definitely recommended when you operate at speeds in excess of your aircraft's category that you use the higher minimums for those airspeeds.

As our new instrument rated pilot may have discovered, instrument meteorological conditions can increase your workload if you are not prepared, so you should plan on giving yourself the extra room and protection the increased minimums give you when operating at the higher airspeeds than those published for your respective aircraft's category. Just remember, the next time you fly an instrument approach, mountains and other obstructions do not care about your aircraft's category. The important thing is that you miss them when flying at the appropriate minimums for your approach speed.

Franklin Li is a student at the University of North Dakota. He was a summer intern with Flight Standards Services General Aviation and Commercial Division. Frank met FAA Administrator Marion Blakey at Ronald Reagan Washington National Airport during the first official appearance of FAA's last DC3, which is the centerpiece of FAA's Centennial of Flight display.

THE FINAL PHASE

story and photos by H. Dean Chamberlain

It finally happened. The *Orphan* flew on June 28, 2003. It may not rank up there with that other '03 history making flight of a hundred years ago, but for me, it was historical. For those not familiar with the *Orphan*, it is my name for my old, 1953 vintage, Piper PA-22-135 *Tri-pacer* that went in for an annual inspection in January 2000 and finally flew again this year. The takeoff was touch and go for a moment. Although no pun was intended, the take off was touch and go because of the security requirements that had to be complied with in flying out of one of the airports in the Washington DC Flight Restricted Zone (FRZ).

The person responsible for all of the work and the many upgrades done on the *Orphan* and who signed off the three and a half year "annual" wanted to fly the aircraft overhead in the local traffic pattern for at least 30 minutes to check the engine and all of the other work done on the aircraft. The problem was although he had completed the required security checks and had his special codes to fly out of the airfield, he could not get permission to do the test flight in the traffic pattern so he could remain within gliding distance of the field in case the aircraft had a problem. Rather than wait until the following Monday to fax a written request to the Transportation Security Administration, he chose to fly to a nearby airport that was out of the FRZ, but still within the Washington area Air Defense Identification Zone (ADIZ), to do the test flight. After an hour overhead the other airport, he landed. The *Orphan* had completed its first flight in more than three years.

As I have discussed in the previous three articles about the *Orphan's* maintenance history and major upgrades, the airplane has provided me a unique learning experience—one that I hopefully will never have to repeat. More expensive than a graduate degree in aviation, it was an experience I have tried to share with you over the years. I hope my lessons learned in buying an old aircraft and having it upgraded will help you avoid some of the mistakes I made. Trust me—after all, I do work for the government—it is cheaper to learn from someone else's mistakes or adventures than it is to pay for your own lessons. But, I must admit, not all of my decisions and efforts were mistakes, expensive, yes; time consuming, yes; but not classic mistakes. I will also admit, if given the chance to change some of my decisions, I would change some—but not all.

The decisions I made were the best I could make at the time, based upon the information then available. Since I work in Washington DC, based upon recent news reports, some might say it was an intelligence breakdown. Others might question if any intelligence was involved. But, what was done was done of my own free will, and I have the receipts to prove it.

Since I discussed the importance of a thorough pre-purchase inspection, title search, the need for a detailed upgrade budget and completion plan, and the critical importance of not buying warranted items such as avionics and instruments a day earlier than necessary before installation so you

The project mechanic (second from left) takes notes as FAA airworthiness inspectors Troy Lawson (left), Ramon Smeltz (third from left), and Robert Nolan (r) inspect the Orphan.

can avoid losing any warranty coverage, I lost all of my instrument and avionics warranty protection because of the extended time required to complete the project before the June 28, 2003, flight, I will limit this article to what became the most challenging part of this three-and-a-half year project: the paperwork.

After 20 years in the military and more than 13 years at FAA, I *know* paperwork. I understand and accept the fact that no aircraft can fly until the weight of its paperwork equals the aircraft's max gross weight. I would say until the paperwork exceeds its max gross weight, but then that would require more paperwork. But in my opinion, it may take you more time getting the paperwork signed approving whatever upgrades you are doing than in doing the actual work.

In today's FAA world where the word "customer" is often spoken, I have my own interpretation of that word. Just like I don't consider myself a "customer" of the Internal Revenue Service—after all, I don't have a choice in paying taxes—I don't think of myself as a customer of the FAA. As the *Orphan's* owner, I had to have FAA approval for the work done on the airplane. Since I can't go to the Alternative Aviation Administration for my approvals to fly in the United States, I have learned some important things that might help you complete your project or any dealings with your local Flight Standards District Office.

I understand the meaning of the word customer. I was a customer when I bought all of the parts for the aircraft. I shopped price, availability, and service of the various companies I bought from. For example, one of my most recent purchases was made online using the Internet. After entering the items I wanted, the company's web site immediately told me the status of each item and if it was in stock. The web site gave me my choice of shipping starting with the least expensive option which took the longest shipping time through the various options to the most expensive shipping method which could deliver my order overnight. I made my decision based upon cost and shipping time. I consider myself thrifty, although some might say I am cheap. Therefore, I chose the lowest cost shipping because it was not worth the extra money to have parts delivered overnight when the person doing the work could only work on the aircraft on Saturdays. After I completed my order, within 10 minutes, I received an e-mail message confirming my order. I felt like a well taken care of customer. I considered myself a customer because I had the freedom of choice. Such is not necessarily the case when dealing with government agencies. And I must admit; I may have been guilty of providing less than prompt service at times in my years of government service. But I digress.

So whether I am an FAA customer in the truest sense of the word or not, I have learned some valuable lessons that will help you when you have to process your paperwork through your local Flight Standards District Office (FSDO). My suggestions might even save you some time or money when dealing with your local friendly aviation authority folks.

The first and most important lesson is that the authorized person or company working on your aircraft must know the FAA's regulations and procedures. It is equally important to know what the local FSDO likes. Although Flight Standards is constantly trying to standardize its offices and processes across the country, people being people, different offices may interpret the same rules, orders, and procedures differently. The secret is finding out what your local office's inspectors want and providing it. Before you start any major project, you or the person who is going to do the work should contact the local FSDO airworthiness inspectors you will be working with to review the project and what FAA requirements will have to be met. This effort will save you and the

inspectors valuable time at the end of the project whether you are building an aircraft or upgrading one.

Then the certificated or authorized person doing the work must know and understand what paperwork must be submitted for FAA approval or acceptance. Complete and detailed paperwork is always preferable to only providing the bare minimum. In some cases, photographs may be appropriate to help document the work performed.

An important part of any significant repair or upgrade project is reviewing the definition between what is a major or minor repair and what is a major or minor alteration. This is a critical interpretation because it drives the scope of the paperwork involved and the use of approved and acceptable data. These terms are defined in Title 14 Code of Federal Regulations (14 CFR) part 1.

Other important terms include supplemental type certificates (STC), technical standard orders (TSO), parts manufacturer approval (PMA), and FAA approved parts. Many of these terms are defined in (14 CFR) part 21, *Certification Procedures for Products and Parts*; and part 43, *Maintenance, Preventive Maintenance, Rebuilding, and Alteration*. Part 43 is vital because it defines what are repairs and alterations, who can do what work on an aircraft, and what record keeping is required. It also discusses the types of documentation you have to submit.

Depending upon your project, FAA form 337, *Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance*), will become one of the most important forms in the life of your aircraft. This is the document most of your work will be reported on. Conversely, when you buy an aircraft, you should look for any filed FAA form 337s which might document work done on your aircraft. Completed FAA Form 337s must be filed with the FAA's Civil Aviation Registry in Oklahoma City, OK. Submitted 337s become a permanent part of your aircraft's official records.

You may want to do a detailed review of your prospective aircraft's records to check for the type of work performed on the aircraft, any damage history, and to ensure work done on the aircraft is properly documented.

Aircraft files are a matter of public record in Oklahoma City. You can visit the office and inspect your records or you can contract with a company to review your aircraft's records and provide you a report about them. This is a case where I think paying someone who does this type of work daily and knows what to look for is worth the money. This type of record search is critical for reviewing an aircraft's title before purchase to discover any recorded, unreleased liens against the title. A clear title is one of the most important documents you can have when buying an aircraft. You don't want the problems of trying to resolve the status of a 20-year old lien that still shows up in the aircraft's records.

For a history of any reported damage or any changes in your prospective aircraft, you can contact the Registry for a copy of the aircraft's file.

US Department of Transportation
Federal Aviation Administration

MAJOR REPAIR AND ALTERATION
(Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020

For FAA Use Only
Office Identification

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. 1421). Failure to report can result in civil penalty not to exceed $1,000 for each such violation (Section 901 Federal Aviation Act of 1958).

1. Aircraft	Make	Model
	Serial No.	Nationality and Registration Mark
2. Owner	Name *(As shown on registration certificate)*	Address *(As shown on registration certificate)*

3. For FAA Use Only

4. Unit Identification				**5. Type**	
Unit	Make	Model	Serial No.	Repair	Alteration
AIRFRAME	*(As described in Item 1 above)*				

You will receive a microfilm copy of your aircraft's records. My file showed the ownership history of the *Orphan* from the day it left Piper Aircraft's factory until the day I bought it. The file included the list of owners, changes in registration, security documents for the various aircraft loans used to finance the aircraft, filed liens, removed liens, and recorded 337s were all there. The operative word here is paperwork filed with the FAA.

No discussion about a major upgrade or maintenance project would be complete without reminding you to review the various FAA advisory circulars, orders, and regulations concerning your project. Just like some aircraft owners and mechanics will try to "hide" work done on an aircraft by, in my words, "omission of details" in the aircraft's records, some may try and minimize work or documentation by not getting the correct FAA approvals. One of the most important roles the FAA serves is the one it plays in the maintenance of safe aircraft. Just like a homebuyer who expects to buy a "sound" house by depending upon the local building codes, building inspectors, and appraisers to ensure the house meets minimum construction standards, aircraft buyers need to be able to depend upon the quality of the work done on an aircraft and the documentation of that work to ensure the safety and value of that aircraft. One of FAA's most important roles is to ensure that what you buy, whether it is an aircraft, appliance, or other aviation part meets appropriate maintenance and safety standards and that the people doing the work are properly trained and qualified. FAA's oversight of both aircraft certification and maintenance is your best protection both in the air and financially.

As a general reminder, for an aircraft to be considered airworthy, it must meet two conditions. According to FAA Order 8130.2E, *Airworthiness Certification of Aircraft and Related Products*, it says based upon case law an aircraft must conform to its type certificate (TC). According to the order, conformity to type design is considered attained when the aircraft configuration and the components installed are consistent with the drawing, specifications, and other data that are part of the TC, which includes any supplemental type certificate (STC) and field approved alterations incorporated into the aircraft.

The second condition is that the aircraft must be in condition for safe operation. The order says, "This refers to the condition of the aircraft relative to wear and deterioration, for example, skin corrosion, window delamination/crazing, fluid leaks, and tire wear."

Based upon the above two conditions, it is important that any aircraft you might be thinking about buying meets its TC data sheet (TCDS) or its TCDS as properly modified. Properly modified and documented are the operative words.

If you are thinking about buying an old aircraft such as my 50-year old *Tripacer,* in those 50 years, you can expect many mechanics have worked on the aircraft, and that they used many parts to maintain the aircraft's airworthiness. The question is does the aircraft still meet it TCDS or its properly modified TCDS. For those not familiar with an aircraft's TCDS, each FAA-approved aircraft's manufacturer lists on the aircraft type certificate data sheet for a given make and model all of the approved equipment installed on the aircraft or approved for use on the aircraft at the time of manufacture. Available through the FAA's Internet web site, an aircraft's TCDS also lists the aircraft's approval basis,

FAA inspectors Robert Nolan (l) and Troy Lawson check for proper installation, correct hardware, security, safety wire, any chaffing or pinch points, and any interference problems as part of their inspection.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

1A6
Revision 33
PIPER

PA-22
PA-22-108
PA-22-135
PA-22S-135
PA-22-150
PA-22S-150
PA-22-160
PA-22S-160

February 12, 1999

AIRCRAFT SPECIFICATION NO. 1A6

Type Certificate Holder — The New Piper Aircraft, Inc.
2926 Piper Drive
Vero Beach, Florida 32960

I - Model PA-22, 4 PCLM (Normal Category Only), Approved December 20, 1950

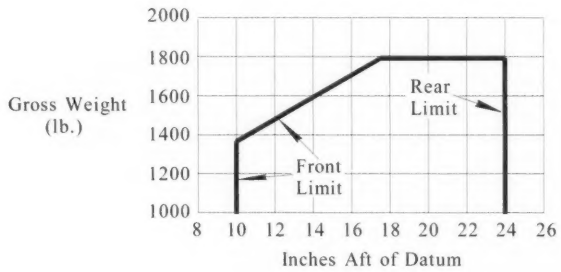
Engine — Lycoming O-290-D

Fuel — 80/87 minimum grade aviation gasoline

Engine Limits — For all operations, 2600 rpm (125 hp)

Airspeed Limits CAS			
V_{ne}	(never exceed)	158 mph	(137 knots)
V_{no}	(maximum structural cruising)	126 mph	(110 knots)
V_p	(maneuvering)	106 mph	(92 knots)
V_{fe}	(flaps extended)	80 mph	(70 knots)

C. G. Range — (+17.5) to (+24.0) at 1800 lb.
(+10.0) to (+24.0) at 1380 lb. or less
Straight line variation between points given.



Empty Weight C. G. Range — None

Maximum Weight — 1800 lb.

Page No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Rev. No.	33	31	31	31	31	33	33	31	32	31	33	32	32	31	31

Required Equipment	In addition to the pertinent required basic equipment specified in CAR 3, the following Items of equipment must be installed: Items 8, 201(a) or 211(a), 202, 205(a), 206, and 401(y).

Specifications Pertinent to All Models

Datum	Wing leading edge
Leveling Means	Plumb from hole in upper channel of front door to center punch mark on front seat cross tube.
Certification Basis	CAR 3, effective November 1, 1949, and Amendments 3-1 through 3-6, effective June 4, 1951. Type Certificate No. 1A6 issued December 20, 1950. Date of Application for Type Certificate September 13, 1950.
Production Basis	Approved for manufacture of spare parts only under Production Certificate No. 206.

Equipment

A plus (+) or minus (-) sign preceding the weight of an Item of equipment indicates net weight change when that Item is installed.

Approval for the installation of all Items of equipment listed herein has been obtained by the aircraft manufacturer except those Items preceded by an asterisk (*). The asterisk denotes that approval has been obtained by someone other than the aircraft manufacturer. An Item marked with an asterisk may not have been manufactured under an FAA monitored or approved quality control system, and therefore conformity must be determined if the Item is not identified by a Form FAA-186, PMA or other evidence or FAA production approval.

Propeller and Propeller Accessories

The following propellers are eligible at the limits shown for diameter and static r.p.m. at maximum permissible throttle setting, no additional tolerance permitted:

1. Propeller (with Lycoming O-290D or O-290-D2 engine)
   Sensenich 74FM59 or any other fixed pitch wood propeller which is rated for the engine power and speed: +11 lb. (-50)
   Static r.p.m.: Not over 2400, not under 2200.
   Diameter: Not over 74 inches, not under 70.5 inches
2. Propeller (with Lycoming O-290D or O-290-D2 engine) - fixed pitch metal
   (a) Sensenich M76AM-2 or +25 lb. (-50)
   (b) Sensenich M74DM +30 lb. (-50)
   Airplane Flight Manual shall be revised to reflect the subject propeller and limits.
   Landplane:
   Static r.p.m.: Not over 2450, not under 2150
   Diameter: Not over 74 inches, not under 72.5 inches
   Seaplane:

its performance data, and its equipment. For example, the TCDS may list one or more propellers approved for the aircraft. If the aircraft you are interested in buying does not have one of the approved propeller models of the proper size installed, then you have a potential problem. The aircraft does not meet its TCDS unless the change has been properly done in accordance with FAA regulations. If the change was not done properly, the aircraft is not airworthy. If you cannot find an appropriate maintenance record and FAA documents that approved the installation of the non-TCDS listed propeller, you will either have to replace the propeller with the correct one or do the necessary work to try and get the installed non-TCDS listed propeller approved by the FAA. Either option could be expensive and time consuming.

This is why a careful pre-purchase aircraft inspection by a qualified and knowledgeable (specific make and model) FAA-certificated mechanic includes checking all installed components against the aircraft's TCDS. If an installed item is not listed, then there must be FAA documentation approving the installation. Otherwise, you may be buying an expensive problem without realizing it. This is why it is critical that an annual inspection or pre-purchase inspection be detailed enough to check on installed components by manufacturer, make, and part number to protect both your safety and the value of your aircraft or potential aircraft. An installed component list by manufacturer and serial number also helps resolve the applicability issue of any FAA airworthiness directives for a given make or model of aircraft or component.

Only through proper documentation and maintenance can you be assured that your aircraft meets its de-

FAA airworthiness inspectors Robert Nolan (l) and Troy Lawson prepare to inspect the engine compartment of the Orphan*. With new electrical wiring, new fuel and oil lines, and a new alternator replacing the original generator, the inspectors want to make sure all the hardware was properly installed.*

signed safety standards and requirements. As a potential aircraft buyer, you need to be able to make informed choices about the aircraft you are interested in buying. As I said earlier, to me, being a customer means the freedom of choice. With that freedom is the freedom to make bad choices. Your job as an intelligent aircraft buyer is to know and understand the nuances of how to buy an aircraft.

Sad to say, there are aircraft out there that are not what their owners represent them to be. Your job is to identify those type aircraft before you purchase one. Am I saying not to buy such an aircraft? No, I am saying if you buy such an aircraft, the cost of that aircraft should be discounted to make up for the expense and trouble required to make it meet its TCDS or properly modified TCDS to be airworthy.

The importance of proper documentation can't be stressed enough. In the case of the *Orphan*, eight FAA form 337s were submitted to the local FSDO. One, because it involved a fuel line modification was forwarded by the FSDO to the New York Aircraft Certification Office (ACO) for review. The FSDO decided to have the ACO review the 337 rather than doing a field approval at the FSDO level.

In checking on the status of the review, I called the ACO and interviewed Mike Muratore about my 337 and what people can do to expedite their paperwork through an ACO review process. Mike is a flight test engineer. He said the ACO's greatest problem is incomplete paperwork. According to him, the engineers at the ACO don't do engineering work on the submitted packages. He said his job is to make sure that the submitted paperwork meets the appropriate rules. One way people can speed up the review process, he said, is by validating their paperwork by stating why they think what they are submitting meets the appropriate rule.

He said another thing people should do is make sure all of the required tests are done and documented for a particular project. For example, in reviewing a complex electrical or electronic submission, he said he would check if the applicant provided data on any interference testing done. He would also check if the applicant provided details of a completed test plan that met the regulatory requirements. Since failure to provide complete documentation can delay any FAA approval, it is important that anyone submitting an approval package review the appropriate rules, advisory circulars, and other information or guidelines on the repair or alteration before submitting the documentation. This will reduce the chance the documentation is returned to you for more work. You need to take the time to ensure the required data and documented work completed was done in accordance with FAA requirements and properly submitted to the FSDO

The Orphan prepares to rotate for its first flight in more than three years.

or ACO. This is why working with a maintenance person who knows how to do the required work and how to submit the proper paperwork for completed work is so important in getting an aircraft back in the air.

Mike said his office tries to provide a two-week turn-around when checking properly submitted paperwork.

When asked what other ways someone can expedite a project, Mike said people should check if there are any STCs or other previously approved procedures that would expedite getting an aircraft back into the air without requiring an ACO review. This is why knowing and understanding the regulatory requirements for making repairs and alterations is so important.

In the case of the *Orphan*, the person doing the work has a good working relationship with the local FSDO, and he is great at detailing and documenting the work accomplished. The eight 337s were approved or accepted, the appropriate aircraft logbook entries made, a revised aircraft flight manual was completed with all of the required supplements and special instructions for continued airworthiness listed, and the *Orphan* was legal to depart Hyde Field in Clinton, Maryland.

But remember this article is about paperwork and flying. Departing Hyde Field was easier said than done. In the case of the *Orphan*, because the work was done at one of the three civil airfields within the special Washington Flight Restricted Zone (FRZ), the FAA certificated person who did the work and oversaw the project had to go through his own paper drill. In his case, although he has ramp access at Dulles International airport in nearby Virginia, he had to go through another detailed security check including fingerprinting, another background check, and an FAA pilot records review before he could get authorization to fly the *Orphan* out of Hyde Field.

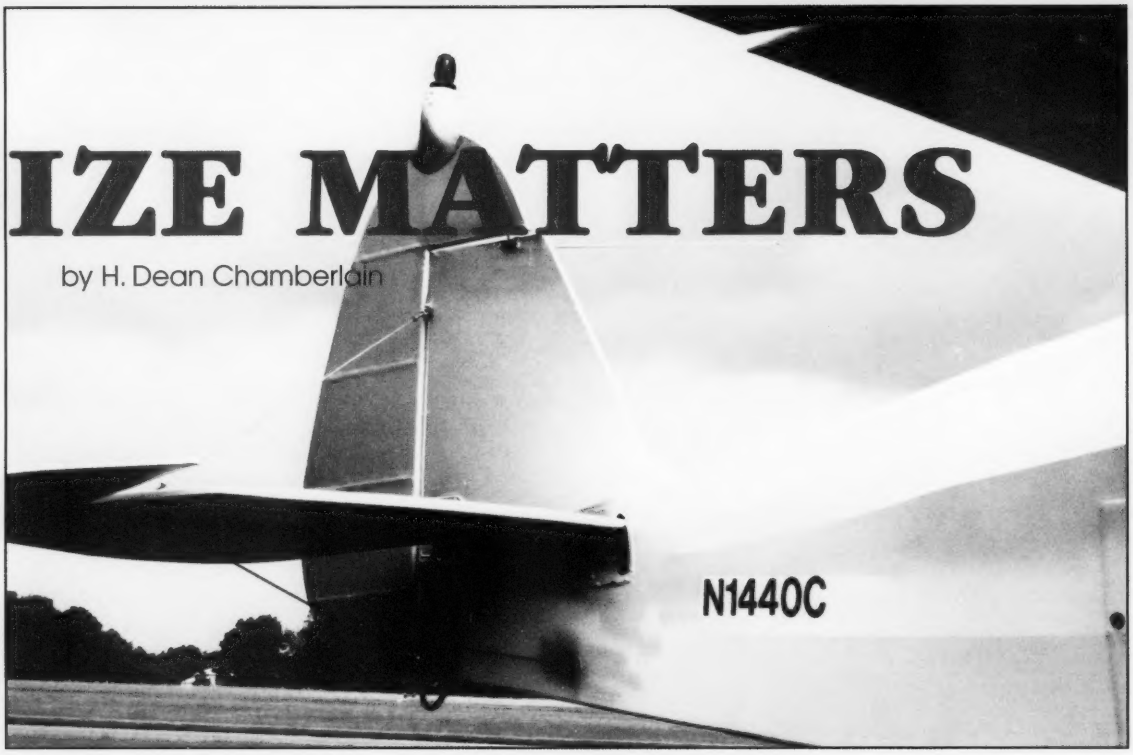
Since this is an article about paperwork, this person's (he requested his name not be used in the article) request for a clearance was initially denied by the FSDO. One of the requirements for the clearance was a current medical. During the course of his background check, the FSDO inspector reviewing the person's FAA file discovered an expired medical listing. Since the person had had a recent FAA medical examination, he discovered his aviation medical examiner (AME) had failed to send the person's medical results to the FAA in Oklahoma City. This took additional time and effort to get the medical results forwarded to Oklahoma City. The good news is this case resulted in a *FAA Aviation News* article reminding pilots to verify their medicals have been properly processed and forwarded to the FAA in Oklahoma City. The article was later reprinted in the Federal Air Surgeon's *Medical Bulletin* to remind AMEs to process their paperwork in a timely manner. In this case, it was better the person discovered his doctor had not sent his medical to the FAA as part of the security background check, than during an accident investigation.

As the old saying goes, no job is complete until all the paperwork is done. In the case of an aircraft project, those words are very true. But if you understand the FAA's paperwork requirements and document your work throughout the project in accordance with FAA requirements, you can wrap up your project and take that first flight with little or no unnecessary delay. But before that first flight, you need to make sure your own paperwork is current. Is your medical, if required, current? Is your flight review and appropriate pilot in command (PIC) requirements current, if you are going to be PIC on that first flight? If it has been a while since you last flew your aircraft, you might want to get checked out in a similar type aircraft to regain your currency in make and model. If you have had an extensive upgrade or a major repair project, you might want to review the FAA's advisory circular, AC 90-89A, *Amateur-Built Aircraft and Ultralight Flight Testing Handbook*. The 99-page handbook provides some great safety ideas to help make that first flight a safe one. It is available on the FAA's web site.

Thanks for listening to the *Orphan's* story. It has been an interesting experience for me, and I hope it has provided each of you some insight in the purchasing and upgrading of an aircraft and lessons learned. See you at the airport.

SIZE MATTERS

by H. Dean Chamberlain



The *Orphan* is ugly. There is no other way to describe it. The old, multi-colored, fabric aircraft needs to be repainted. With almost all-new sheet metal on it, from prop spinner to engine cowlings to fairings to fuel tank covers, each a little different color, the aircraft is simply ugly. All of its parts and fabric needs to match at least one color, any color, but everything should match. But repainting an aircraft raises an interesting question.

What size should its registration markings be? Title 14 Code of Federal Regulations (14 CFR) Part 45, *Identification and Registration Marking*, provides the answer. Part 45 describes how aircraft, engines, propellers, certain parts, and U.S. aircraft must be marked.

Subpart C, *Nationality and Registration Marks*, of part 45, then explains how U.S. aircraft must be marked. There are different rules for different types of aircraft. As everyone knows, the Roman capital letter "N" is the nationality marking for U.S. registered aircraft. 14 CFR part 47 specifies how the "N" number is comprised while part 45 tells how and where to mark it on the aircraft. According to section 47.15(b), the number may not exceed five symbols in addition to the prefix letter "N". The letters "I" and "O" may not be used. The symbol may be all numbers, one to four numbers and one suffix letter, or one to three numbers and two suffix letters. The first zero in a number must be preceded by at least one of the numbers 1 though 9.

Part 47 then goes into great detail how to register an aircraft with the FAA.

Now that you know where to find the information on how to register an aircraft, and you have your "N" number, whether issued by FAA or a special requested "N" number from FAA, the fun starts with how are you going to mark your aircraft. Since the *Orphan* is a fix-winged aircraft, we will use it as our example.

But first, aircraft manufactured today or repainted today with certain exceptions must have 12-inch high registration marks. To help everyone comply with the current requirements, part 45, Subpart C, *Nationality and Registration Marks* goes into great detail about how to mark your U.S. registered aircraft. From section 45.21, General, through section 45.33, Sale of aircraft: removal of marks, Subpart C provides a wealth of information about how to mark your U.S. registered aircraft.

From how to display marks, section 45.23, to location of marks on fixed and non-fixed wing aircraft, sections 45.25 and 45.27 respectively, to the size of marks and what you can do if your aircraft doesn't have the space necessary to comply with the size of the marks required, section 45.29, to the following special rules for certain types of aircraft, you should be able to answer most of your questions about registration marks in Subpart C. For those unique questions you cannot answer in Subpart C, you should contact your local FAA Aircraft Certification Office.

Although the standard registration mark is 12-inches in height using Roman letters as appropriate, Part 45 has special rules for certain aircraft. Section 45.22, Exhibition, antique, and other aircraft: Special rules, outlines those special rules. They include:

(a) When display of aircraft nationality and registration marks in accordance with Sections 45.21 and 45.23 through 45.33 would be inconsistent with exhibition of that aircraft, a U.S.-registered aircraft may be operated without displaying those marks anywhere on the aircraft if:

It is operated for the purpose of exhibition, including a motion picture or television production, or an air show;

Except for practice and test fights necessary for exhibition purposes, it is operated only at the location of the exhibition, between the exhibition locations, and between those locations and the base of operations of the aircraft; and

For each flight in the United States:

It is operated with the prior approval of the Flight Standards District Office, in the case of a flight within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for the takeoff airport, or within 4.4 nautical miles of that airport if it is within Class G airspace; or

It is operated under a flight plan filed under either Section 91.153 or Section 91.169 of this chapter describing the marks it displays, in the case of any other flight.

(b) A small U.S.-registered aircraft built at least 30 years ago or a U.S.-registered aircraft for which an experimental certificate has been issued under Section 21.191(d) or 21.191(g) for operation as an exhibition aircraft or as an amateur-built aircraft and which has the same external configuration as an aircraft built at least 30 years ago may be operated without displaying marks in accordance with Sections 45.21 and 45.23 through 45.33 if:

It displays in accordance with Section 45.21(c) marks at least 2 inches high on each side of the fuselage or vertical tail surface consisting of the Roman capital letter "N" followed by:

The U.S. registration number of the aircraft; or

The symbol appropriate to the airworthiness certificate of the aircraft ("C", standard; "R", restricted; "L", limited; or "X", experimental) followed by the U.S. registration number of the aircraft; and

It displays no other mark that begins with the letter "N" anywhere on the aircraft, unless it is the same mark that is displayed under paragraph (b)(1) of this section.

(c) No person may operate an aircraft under paragraph (a) or (b) of this section—

In an ADIZ or DEWIZ described in Part 99 of this chapter unless it temporarily bears marks in accordance with Sections 45.21 and 45.23 through 45.33;

In a foreign country unless that country consents to that operation; or

In any operation conducted under Part 121, 133, 135, or 137 of this chapter.

(d) If, due to the configuration of an aircraft, it is impossible for a person to mark it in accordance with Sections 45.21 and 45.23 through 45.33, he may apply to the Administrator for a different marking procedure.

Section 45.25, Location of marks on fixed-wing aircraft, then describes how U.S. registration markings for fixed-wing aircraft are to be located on an airplane. The regulation says:

(a) The operator of a fixed-wing aircraft shall display the required marks on either the vertical tail surfaces or the sides of the fuselage, except as provided in Section 45.29(f).

(b) The marks required by paragraph (a) of this section shall be displayed as follows:

If displayed on the vertical tail surfaces, horizontally on both surfaces, horizontally on both surfaces of a single vertical tail or on the outer surfaces of a multivertical tail. However, on aircraft on which marks at least three inches high may be displayed in accordance with Section 45.29(b)(1), the marks may be displayed vertically on the vertical tail surfaces.

If displayed on the fuselage surfaces, horizontally on both sides of the fuselage between the trailing edge of the wing and the leading edge of the horizontal stabilizer. However, if engine pods or other appurtenances are located in this area and are an integral part of the fuselage side surfaces, the operator may place the marks on those pods or appurtenances.

Although these sections provide a brief overview of the registration marking requirements for U.S. registered aircraft, my recommendation is if you have any questions about your aircraft's registration marks is to check with your local Aircraft Certification Office or Flight Standards District Office for advice. Painting or repainting your aircraft is a time consuming and potentially expensive project if you are paying someone to do it for you. When painting your aircraft, if it is a fabric-covered aircraft like the *Orphan*, you need to remember to follow the fabric and paint manufacturers' recommendations to ensure compatibility between the type of fabric and the type of paint. Then as Section 45.21(c)(1) states in part, "Except as provided in paragraph (d) of this section, be painted on the aircraft or affixed by any other means insuring a similar degree of permanence: (2) Have no ornamentation: (3) Contrast in color with the background; and (4) Be legible.

Now you know what type and size of marks you must use, where you must place them, and now how to paint or affix them to the aircraft, you are ready to paint or repaint your aircraft.

But before you rush off with your spray gun to start painting your aircraft, I would like to offer one final thought about painting. One of the inspectors who reviewed this article told me the story about a pilot who had a special graphic painted on her aircraft. When the woman later tried to sell the aircraft, no one was willing to buy the aircraft until she reduced her asking price enough to offset the cost of repainting the aircraft. So if you plan on repainting your aircraft, you may want to consider the future resale value of the aircraft with your new paint scheme as well as does its registration markings comply with the regulations.

Happy flying.

Tales of an ASI

I Remember When...

by Al Peyus

Recently, while out with a certificated flight instructor (CFI) at a large fixed base operation (FBO), I was chagrined to find a lack of knowledge that was a "given" a few years ago. I was passing the time by asking a few simple questions to keep my mind alert as well as find out the level of knowledge of the instructor I was about to be "challenged" by.

Fuel questions have always been a great "ice breaker" to start a challenging interchange of "I'll bet you didn't know." The Cessna we were to fly is designed to use both 100/115 and 100/130 aviation fuel (avgas). Both are referred to as "low lead."

When asked what would happen when the 100/115 was unavailable, my instructor's response was correct. We would simply use the 100/130 grade fuel. Then I asked, "If we still had some 100/115 fuel in the tanks what would we see in sampling the fuel?"

After some stuttering and stammering my instructor said we would see the predominant fuel color. Wrong! Then my next question was, "What would happen if the fueler inadvertently poured any of the different jet fuels into our tank?" From the instructor's puzzled look I realized the tried and true test of color, smell, feel, evaporation, and residue to check fuel were lost to the wind.

What were the correct answers? If two different aviation fuels were mixed, the fuel color would be clear, just like water. If a jet fuel is mixed with any aviation fuel, the color again will turn to a clear color. Well, now how do you differentiate between water in the tanks, a mix of aviation fuel (100/115 and 100/130), or mix of aviation fuel and jet fuel? Each has the same clear color. One useful fact is that water and jet fuel are heavier than avgas and will settle to the bottom of the sample, so a friction line between these layers appears as a hair thin gray line. What do you do now? Is it water or jet fuel?

Many facets of aviation training are based on the rule of five. We have five mandatory reports required during instrument flight, the five "T's" at the outer marker (more on these in a latter report), and five differences to check in fuel (color, smell, feel, evaporation, and residue). Long gone are the days of 80/87 (Red) and 130/145 (Purple) avgas. Our FBO uses 100/115 (Blue) as the normal avgas and 100/130 (Green) as the fall back fuel.

When we check a fuel sample before the first flight of the day or after every refueling, we always check to make sure the fueler gave us the proper amount of fuel. Then, we should check, through fuel sampling, the color, smell, feel, evaporation, and residue to assure the proper fuel was pumped into our tanks.

Avgas is colored by a dye to denote the octane and lead level. The higher the octane, the more letters in the description of color denoting that specific fuel. Next, we check for smell. Does it smell like avgas (just like car gasoline)? Kerosene (jet fuel) has an odor very un-like avgas. Could it be water which has no smell of its own and heavier than avgas causing it to settle to the bottom? If the fuel sample is clear, there is no bottom settlement, and the aroma is indefinite, use the other four tests to confirm it is or is not avgas.

The next step is why pilots always smell "funny" after a preflight. We "feel" the fuel. This is accomplished by pouring a small amount over one finger (just enough to cover the tip) and rub it with another finger. Avgas does not feel slippery. Jet fuel always feels slippery because it is kerosene.

After we have poured the fuel on our fingers, we watch for the evaporation. Avgas evaporates rapidly. By the time we have rubbed our fingers together, the fuel should have already started to evaporate. Jet fuel does not evaporate any way near as fast as avgas.

Lastly, we check the residue from the sampled fuel on our finger. Avgas leaves a residue from the chemicals that are mixed into it. This residue leaves a white coating that seems to hang onto our finger print loops and swirls. Jet fuel does not leave a residue that is as immediately visible.

Prior to the mid to late 1970's, Red avgas (80/87) was used in the early Cessna, Piper, and Beach trainer models. We had and still have the 100/115 Blue low lead designated for most mid-range aircraft models. The 100/130 Green was designated as the primary fuel for the larger reciprocating engine single and multi-engine aircraft of all makes and models with the reciprocating engine.

Lastly, we had the 130/145 Purple which was prescribed for the "round" engine aircraft. This fuel was the high lead and high octane mixture designed to keep the radial engines running smoothly and cleanly.

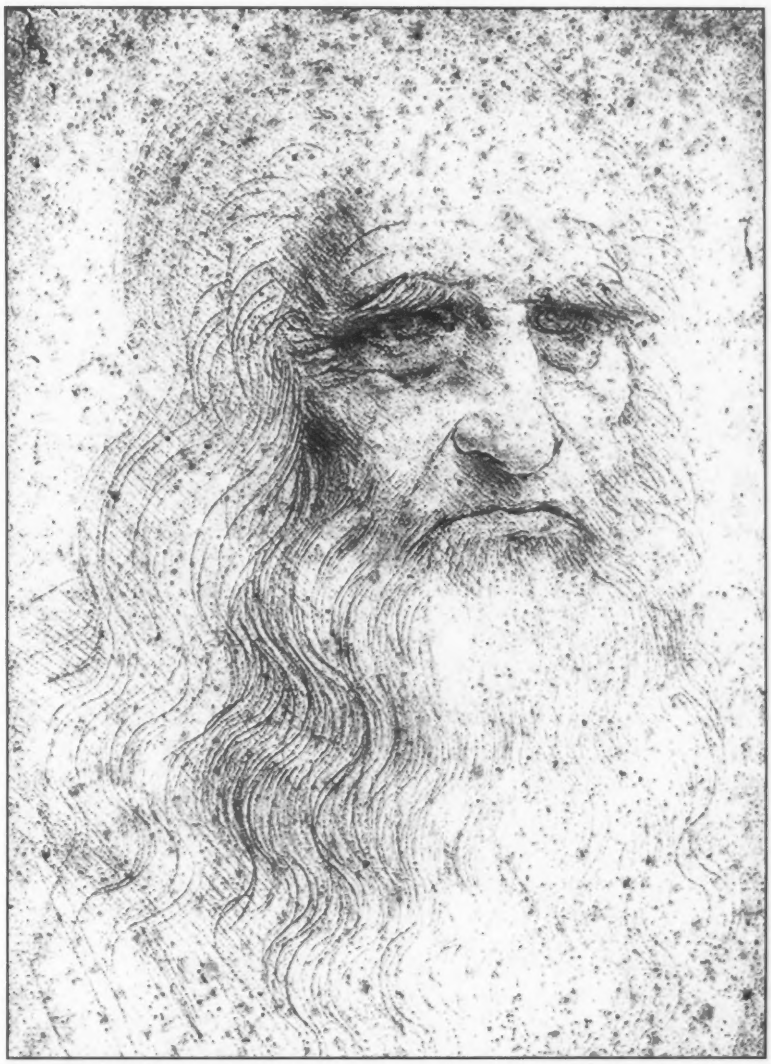
Although the 130/145 Purple has long ago disappeared from today's market, there still is a very limited supply of 80/87 Red in some parts of the country.

Engine manufacturers have since redesigned their engines to take the most common and available fuel

(Continued on Page 32)

Leonardo da Vinci, The First Aerospace Engineer

With the Centennial of Flight almost upon us, it seems appropriate that we honor the man many call the first aerospace engineer. Better known as the painter of such masterpieces as *The Last Supper* and the *Mona Lisa*, Leonardo da Vinci was also known for his insatiable thirst for knowledge. The idea of flight captured his imagination and he spent many hours devoting his fertile mind to the problem of man joining birds in flight. An idea that would persist in intriguing many more generations and take many shapes and forms before two gentlemen from Dayton would achieve success—but that is another story. Leonardo, for all his genius, failed to achieve a design that could get a man off the ground, but the brilliance of his 15th century sketches pointed the way to the eventual development of the parachute and the helicopter, if not the airplane itself.



Born on April 15, 1452, near the Tuscan town of Vinci, Leonardo was the illegitimate son of notary Ser Piero da Vinci and a young woman named Caterina. He was raised by his father and at age 16 he began his apprenticeship with Master Verrochio of Florence, a noted goldsmith and sculptor and typical Renaissance seeker of truth. Encouraged by Verrochio, Leonardo mastered not only the arts, including music, but all the known physical sciences as well, including mathematics, biology, astronomy, and physics. By the time he was 21, he had the skilled, expressive hands of an artist and the mind of a scientist/philosopher. Whatever interested him, he pinned down on his drawing board in the form of a sketch or detailed drawing. His painting brought him early fame, since art was a premier commodity in Renaissance Europe, but the exploration of the physical world remained his passionate interest and his boyhood fascination with the flight of birds never left him.

As a biologist who had dissected many birds as well as human remains, Leonardo recognized that proportionally man does not have as much muscular power available for wingpower as do birds. To him the solution was simple, supply an adequate mechanical linkage and leverage for a human flying machine. With painstaking care and precise draftsmanship, he calculated the center of gravity of various birds, and he worked out weight/lift ratios and the wing area necessary to support the average man, as well as the leg and arm power required to move the wings in a birdlike manner.

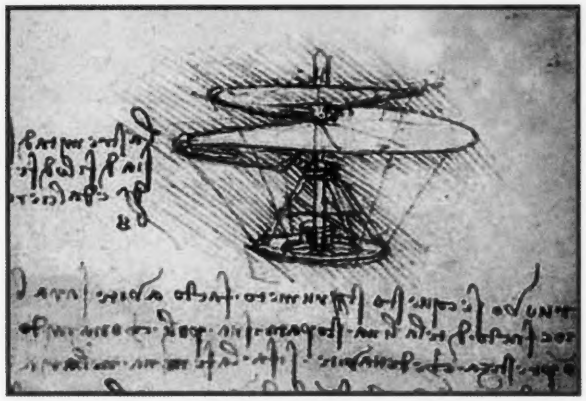
His early designs, beginning in

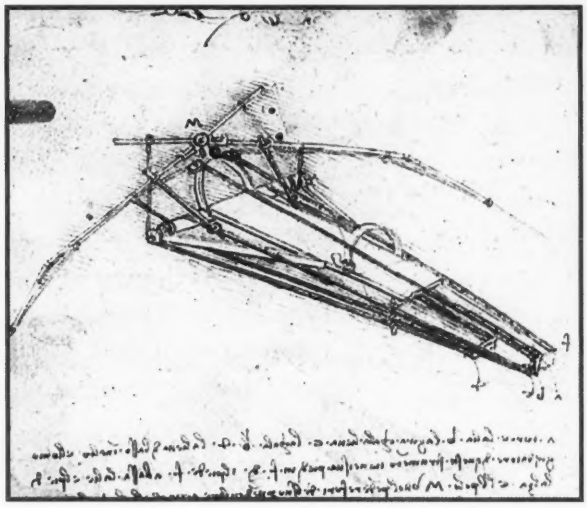
1486, looked like a surfboard to which the prone aviator was fastened by means of an iron girdle. Wings were operated (a downward and rearward beat) by means of stirrups, with the right foot lowering the wings and the left foot raising them. Later he introduced hand cranks to help the wing elevation and added a rudder attached to a hoop around the pilot's head (a device later used until the time of the Wright brothers first powered flight).

A designer, not a builder, Leonardo cautioned any ambitious craftsman that "this machine should be tried over a lake, and you should carry along a wineskin, so that in case you fall you will not be drowned." Thus was proposed the first form of survival gear for pilots, and a very practical idea, considering the weight of his flying machine.

Leonardo later designed a boat-shaped ornithopter, using oars to move the wings; a pedal-powered machine; and various other combinations of hand and leg power with spring devices to assist in the recovery stroke. He also became interested in the helical wheel as a form of airscrew and in 1486 to 1490 sketched model designs for a vertical lift machine which appears to be the earliest suggestion for a helicopter. Incidentally, he used the same principle of the helix to suggest a means of harnessing the movement of heated air as a source of power to continuously turn a roasting spit—actually a very practical design.

There is no evidence, however, that any of Leonardo's aeronautical designs were ever built, let alone put to the test. Whether this is because their impracticality—in terms of excessive weight and inadequate power—was apparent to the inventor or whether he tested some models in secret without success or whether there were other reasons why experimentation never took place, it is difficult to know. It is known that in 1503 Leonardo became aware of a well-publicized experiment with a glider type of flying machine built by one Giovanni Battista Danti, a mathematician. As part of the festivities of an important wedding in Perugia, Danti launched himself in the glider from the spire of a local church. For a moment he hovered in the air, then his machine caught on a projection and crashed, leaving its inventor with a broken leg.



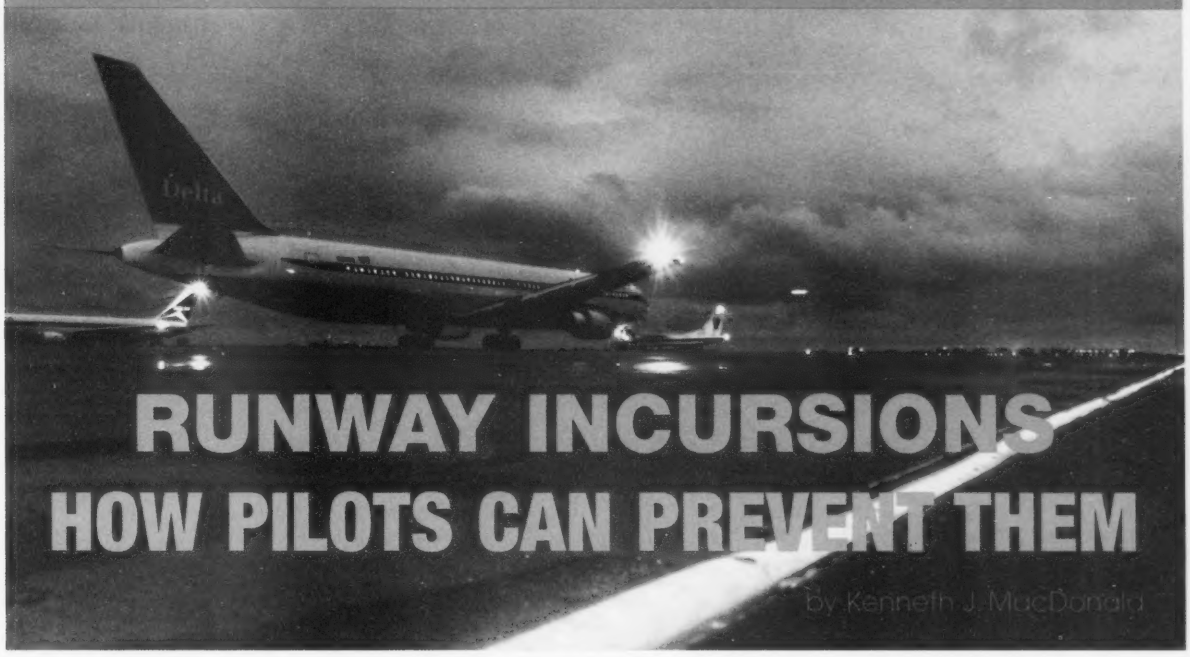


The Aerial Screw (top) was designed in the 1480's and is considered the ancestor of today's helicopter. The Flying Machine (below) was designed in 1490. The aviator was to lie prone and work the wings with his arms and legs.

Consequently, Leonardo's last phase of aeronautical design centered upon a glider which he apparently hoped to launch from a hilltop in Fiesole, 1,300 feet above Florence. A reference in his notebook in 1505 indicates that he hoped to win "eternal glory" with this flight, but there are no records of it ever having been made or attempted. When the great genius died in 1519, he bequeathed all his manuscripts, drawings, and various instruments and tools to his favorite pupil, Francesco Melzi, who kept them away from prying eyes for 50 years. Later Melzi's son made the horde available to the public, but it was not until well into the 18th century that Leonardo's influence on the development of aviation was broadly experienced.

Perhaps as one of his friends said of Leonardo after his death, as a birdman he was a magnificent painter. His determined efforts to design a successful ornithopter may, in fact, have sidetracked later experimenters, who continued to experiment with flapping wings until the 20th century. But there is no question that Leonardo was the first to set the pattern for a scientific investigation of air as a medium of transportation and for the anatomical study of birds in determining the principles of aerodynamics. His confidence in the ability of man to do all that he dared is, no doubt, a continuing source of inspiration to all who have worked in aviation. ✢

RUNWAY SAFETY CORNER



RUNWAY INCURSIONS HOW PILOTS CAN PREVENT THEM

by Kenneth J. MacDonald

On March 27, 1977, at Tenerife in the Canary Islands, two Boeing 747s collided resulting in the loss of 583 people. It was the worst accident in aviation history, and it happened on the ground! This clearly was a runway incursion accident. The accident was caused by poor communications and a false assumption made by a pilot. Key communications were blocked, and the pilot of one 747 assumed it was cleared for take-off, when in reality the other aircraft was still on the runway, but not visible because of fog.

Since this tragic accident at Tenerife, surface accidents around the world continue to take their toll. Mexico City, October 1979 - a pilot lands on a closed runway with 79 fatalities; Los Angeles, November 1991 - a Boeing 737 lands on a commuter aircraft holding in position; Quincy, Illinois, November 1996 - two aircraft collide at an intersection with 14 fatalities; Sarasota, Florida, March 2000 - two general aviation training aircraft collide at an intersection killing all on board; Milan, Italy, October 2001 - a Cessna *Citation* entered a runway and collided with an MD80 on take off roll with 122 fatalities. Every day aircraft intrude on runways where they are not supposed to be. In the year 2000 there were 431 runway incursions in the United States. Of these, 67 were classified Category A and B, serious enough to pose a significant risk of collision. Runway incursions are a serious threat to aviation safety.

Improvements

The National Transportation Safety Board has had the runway incursion problem on their most wanted list of safety improvements since the early nineties. The FAA is putting a high priority on reducing runway incursions. A Runway Safety office has been established at FAA headquarters in Washington, DC, and a Runway Safety Program Manager has been assigned to every FAA region in the country.

Many airports have had Runway Safety Action Team meetings. These meetings include personnel from the FAA's Regional Runway Safety, Airports, Air Traffic, Airways Facilities, and Flight Standards offices who meet at the airport with airport management, the local traffic control tower personnel, and airport user groups. You may have noticed some of the results of these meetings: improved security of the airport operating area, a required driver training program, improved surface markings and signage designed to make your taxi job easier and safer, and a heightened awareness by controllers of potential surface problems. The FAA and the AOPA have distributed safety education and training material to pilots and flight instructors. Studies are being made on how existing and new technologies might help pilots prevent runway incursions. The FAA also supplies runway safety information through a web site, <www.faa.gov/runwaysafety>. All these things have helped to improve runway safety. However, in the

final analysis, it is the pilot in the aircraft, the controller in the tower cab, and the vehicle driver on the airport tarmac who cause the incursions. Runway incursions are the result of a human failure. We are interested in how we as pilots can mitigate these errors and thus reduce runway incursions.

Definitions

In order to clearly understand what a runway incursion is we must define it. The FAA has done this. "A runway incursion is any occurrence in the airport runway environment involving an aircraft, vehicle, person, or object on the ground that creates a collision hazard or results in a loss of required separation with an aircraft taking off, intending to take off, landing, or intending to land. In addition, even if a collision hazard does not exist, if a pilot enters a movement area or crosses a hold short line without a clearance, the pilot is in violation of the Federal aviation regulations. This pilot has caused a surface incident which is defined as "Any event where unauthorized or unapproved movement occurs within the movement area, or an occurrence in the movement area associated with the operation of an aircraft that effects or could effect the safety of flight."

Interventions

An airport is a place where there are a great many aircraft operating close to one another in a very complex environment, so there are many opportunities for a pilot to make an error when taxiing an aircraft. Pilots are human and it is in the nature of humans to make errors. In the airport environment these errors result in degraded pilot performance and runway incursions. The FAA 2002 Runway Safety Blueprint states: "The major breakdowns in operational performance that result in runway incursions at towered airports are:

Pilots who:

a.) enter a runway or cross the hold short line after acknowledging hold short instructions,

b.) take off without a clearance after acknowledging "taxi into position and hold" instructions."

We know that a pilot does not go to the airport on a particular day with the intention of causing a runway incursion. Yet pilots make errors and runway incursions result. Are there human limitations that lead pilots into making these errors? Let's look at the first operational breakdown and see. A pilot who "enters a runway or crosses a hold short line after acknowledging hold short." This pilot, upon calling ground control, was told to taxi to runway 23 via S, E, and G, hold short of 29, but when they reached runway 29 they entered it causing an aircraft over the threshold to go around, thus causing a runway incursion.

Humans process information in a limited channel system. We have a great capacity for sensing information, but the decision making process consists of a single channel and is constantly time-sharing inputs. Basically we do one thing at a time. While we are processing one piece of information, the others are sent to short term memory, which will only hold it for 10 to 20 seconds. Unless we actively rehearse it, the information will be forgotten. The end result is that the pilot in the example read back the hold short clearance, but this information was replaced by something more pertinent to him/her at the time and the pilot forgot to hold short.

One way to intervene in the process and insure that we stop before entering a runway when not cleared is to develop the habit of hesitating whenever approaching any runway. Slow down and ask yourself the question. "Am I cleared to enter this runway?" If there is the slightest doubt, stop and ask the controller if you are cleared. This develops a good habit and habits are a powerful influence on human behavior. Thus, we will not enter a runway when not cleared to do so.

Pilots also become distracted and cross the hold short line without seeing it or realizing they are there. Distractions require the use of our limited attentional resources. A pilot, when distracted, is focusing his/her attention on doing something (for example, programming a GPS or FMS system)

other than their primary task which is taxiing the aircraft. It is extremely important that we pay strict attention to what is going on around us, and that we know exactly where we are relative to our planned taxi route. To eliminate distractions as a factor in causing a runway incursion, we must remember that taxiing an aircraft is a critical phase of flight and avoid any duties that take our attention away from the primary task of taxiing the aircraft. Prioritize your tasks and maintain vigilance whenever you are moving on an airport surface. Remember that we are not going to be successful in doing two important tasks at the same time so you must either stop the aircraft or delay the secondary task till later. If you are performing a secondary task while trying to taxi the aircraft, you may not even see the runway holding position sign or the runway holding position marking and cross the line into the runway safety area. Don't become a runway safety statistic; place your attention on the most important task, taxiing the aircraft.

Being unfamiliar with or having a lack of knowledge of an airport is another reason pilots cause runway incursions. There is no real excuse for having a runway incursion because of a lack of knowledge of the airport layout or because you are unfamiliar with the airport. Resources are available to help, so this should never be an issue. Airport diagrams that show taxiways and runways are available on the FAA Runway Safety web site, on the Aircraft Owners and Pilots Association (AOPA) web site, and in the Jeppesen Approach Plates. Use the airport diagram when moving on the surface of an airport. If you are expecting a complex taxi clearance, write it down. It is much easier to taxi if you understand the route. If you still have questions, ask the ground controller for progressives. They are ready and willing to help you.

The number two problem has to do with pilots who "acknowledge a clearance to taxi into position and hold and then take off without a clearance." Believe it or not, it is possible to forget whether you were told to takeoff or taxi into position and hold in the short time it takes to move the aircraft from the hold short line into the take off position. You are adding power, concentrating on moving the aircraft so that it is properly lined up on the runway centerline, thinking of the proper rotation speed, the wind, the heading to turn to after take off, the altitude to begin the turn, the first nav fix, and any pertinent emergency procedures. There is plenty to keep the mind occupied, thus as we have seen before, it is very possible that we will not remember what we were cleared to do when we get into position on the runway. To mitigate the undesirable consequences of this error we have to maintain focus on the taxi into position and hold clearance. One way to do this is to tell yourself several times while moving into position "we are going to hold in position." This will hold this fact in our memory during the time we are moving the aircraft into position and prevent us from forgetting the clearance to hold.

After we are holding in position on the runway another human weakness may come into play with the possibility of serious consequences. Let's look at a possible scene. Aircraft number one is in position on the runway awaiting take off clearance. Aircraft number two is holding in position on another runway. When the clearance is issued "Aircraft number two cleared for take off," both aircraft begin their take off roll. This is obviously a very dangerous situation. It happened because the pilot of aircraft number one was anticipating a take off clearance and missed the aircraft call sign. The pilot only heard "cleared for takeoff." This is called expectancy and is the "we hear what we want to hear and see what we want to see" syndrome. Whenever expectancy is high we are likely to make a false assumption and only hear that part of a communication that we are interested in. This can happen at any time, but is more likely to happen if we are under stress (for example, we are in a hurry to go) or if we are fatigued. Stress and fatigue are factors in many aviation incidents.

Another way this can happen is for part of a communication to be lost due to something like distortion or noise. Humans are very good at filling in missing information, so a pilot may assume that a take off clearance was for his/her aircraft. This is what happened at Tenerife. There was a squeal that blocked a key transmission and the pilot assumed he was cleared for takeoff.

To mitigate these errors we have to realize that they can happen. When we are in position on a runway ready to go, we must pay particular attention to the communication so that we are absolutely positive that the clearance issued was for our aircraft. If there is even the slightest doubt, ask the controller.

Pilots are the cause of about 55% of all runway incursions. We have discussed using the following interventions to mitigate errors that are a major cause of these incursions:

1. Hesitate when approaching any runway, and ask the question, "Am I cleared to enter this runway?" If there is any doubt, ask the controller.
2. Maintain vigilance when taxiing and pay attention to the primary job—taxiing the aircraft. Delay other activities to a later time.
3. Use the airport diagram and ask for progressive taxi instructions.
4. When cleared into position and hold, keep repeating "we are going to hold" when moving the aircraft.
5. When in position on a runway realize that you could possibly accept a clearance not meant for you, and be extremely careful that the clearance issued is for your aircraft. If anything causes the slightest doubt, don't go—ask the controller.

I believe that if we adhere to these straightforward procedures we will be able to significantly reduce the number of runway incursions caused by pilots.

Kenneth J. MacDonald is a Senior Flight Standards Specialist in the FAA's New England Region Runway Safety Office.

NTSB Propeller Warning Becomes an AD

The FAA is adopting a new airworthiness directive (AD) for certain Hartzell Propeller, Inc., McCauley Propeller Systems, Sensenich Propeller Manufacturing Company, Inc., and Raytheon Aircraft Company (formerly Beech Aircraft Corporation) propellers returned to service by T & W Propellers, Inc., of Chino, CA. The AD requires maintenance actions amounting to an overhaul of the affected propellers. This AD is prompted by the results of a National Transportation Safety Board (NTSB) investigation of a failed propeller blade and subsequent inspections of various propeller models returned to service by T & W Propellers, Inc. The FAA is issuing this AD to detect unsafe conditions that could result in separation of a propeller blade and loss of control of the airplane.

This AD results from an NTSB Safety Recommendation issued after the investigation of a January 24, 2003, accident in which a two and a half foot section of a blade separated from a Hartzell model HC-92ZK-2 propeller installed on the No. 2 (right) engine of a Beech 95 (*Travelair*), N2733Y. This happened shortly after takeoff from Cable Airport, Upland, California. The separated section of the Hartzell 8447-12A (Z-shank) blade was recovered about one mile from the accident site and examined by the NTSB Materials Laboratory. The examination of the fracture surfaces revealed that the failure was due to fatigue cracking that initiated at corrosion pits on the internal surface of the blade's pilot tube hole. The cracking had progressed through about 60 percent of the blade cross section and around more than half of the pilot tube bore before final overstress separation. According to maintenance records, T&W Propellers, LLC, Chino, California, performed the overhauls for both propeller assemblies. The overhaul entries, dated January 11, 2000, indicated that the overhauls were completed in accordance with Hartzell Manuals 105A (Propeller Model HC-92ZK-2 Overhaul Manual), 133C (Aluminum Propeller Blade Overhaul Manual), and 202A (Hartzell Standard Practices Manual), and all applicable service bulletins, service letters, and airworthiness directives to date. The propellers were installed on the accident airplane on May 16, 2002, and failed on their initial flight after several ground tests.

The Safety Board also learned during its investigation that, on March 7, 2003, personnel at a repair facility in Redding, California, notified the propeller manufacturer that they had received a Z-shank propeller that had been overhauled six years earlier but had not been operated in service since the time of overhaul. The serviceable tag attached to this propeller indicated that T&W Propellers had overhauled it on December 29, 1997. The repair shop observed that the propeller was not in compliance with overhaul requirements for inspection, rework, and finishing. Specifically, the shop reported that both blades exhibited severe corrosion pitting in the same bore area and a lack of chemical conversion coating and required paint in specified areas. The shop also noted that a substance that appeared to be wash primer had been painted over areas of significant corrosion.

As a result of the investigation, the NTSB published Safety Recommendation A-03-13 and –14 on April 29, 2003, which recommends that the FAA:

> Require the immediate inspection of all propeller parts and propeller assemblies overhauled or inspected by T&W Propellers, Chino, California, to determine if they are airworthy. (A-03-13) The Board is concerned that other propeller blades and components overhauled by T&W Propellers may contain similar uncorrected defects.
>
> Require that all Hartzell Z-shank propellers be overhauled every 2,000 hours or five years, whichever comes first, as recommended by the manufacturer. (A-03-14) Because the corrosion that was observed on these blades has been found primarily in areas that the manufacturer has designated as safety critical, the NTSB is concerned that, without immediate action, a similar accident could occur.

I Remember When...

(Continued from Page 26)

(100/115 LL and 100/130). The primary reason for the loss of the two extreme grades of aviation fuel was economy. Because the aviation industry uses such a small percentile of all the gasoline produced for the world's markets (some estimates have been at less then 10 per cent of all fuel produced), it is more economical for the gasoline industry to produce only the "general" grades of avgas.

This brings me back to my, "I'll bet you didn't know..." questions with my instructor. Much of the information that was passed along in the "old days" is still very pertinent in today's flying environment. It is information that should still be available for all pilots and applicants. You should always question and seek to improve even the most mundane level of your understanding of our environment, the National Air Space System, weather, the aircraft, and the tools we use. This should include having fun "hangar flying" with some of the "old" instructors you know to help keep much of the "forgotten" knowledge alive and available.

Al Peyus is a General Aviation Operations Aviation Safety Inspector in Flight Standards' General Aviation and Commercial Division.

Aviation Maintenance Alerts

Cessna; Model 414; STC SA2680SW (400 Horsepower Engine Conversion)

The FAA Small Airplane Directorate, Continued Operational Safety (ACE-113) located in Kansas City, Missouri, provided the following article. *(The article is published as it was received from ACE-113.)*

STC SA2680SW modifies the Cessna 414 airplane by the installation of larger engines and different propellers. The STC replaces the factory installed 310 horsepower TCM TSIO 520-() engines and three-bladed propellers with 400 horsepower Textron-Lycoming IO 720-() engines, that are turbo-normalized, and four-bladed Hartzell propellers. The installation includes an overboost safety protection system designed to limit manifold pressure of the turbo-normalized system to that of sea level at all altitudes up to the system critical altitude.

If the safety protection system is not properly installed and functioning, a manifold overboost condition can occur creating excessive manifold pressures to be generated that may exceed the design specifications and may lead to failure of engine cylinder assemblies, crankshaft, and/or engine crankcase.

Operators should have a properly FAA-certified mechanic inspect any Cessna 414 with STC SA2680SW installed for proper installation and operation of the engine overboost redundant safety protection system. Aircraft may be returned to service after inspection has determined installation is in an airworthy condition.

System components include:

Turbocharger Garrett Model TE0659

Garrett P/N 406610-27

Pressure Relief Valve (31 in. Hg) Garrett P/N 470944-16 (old p/n)

Garrett P/N 470944-25 (new p/n)

Variable Absolute Pressure Controller Garrett P/N 470836-1

Wastegate Valve Garrett P/N 481036-1

Garrett-Airesearch Aerospace is now Kelly Aerospace, Montgomery, Alabama.

Flight crews should be advised that less than cautious operation of throttles could result in an overboost condition on engines that do not have a properly functioning overboost protection system. Monitoring of manifold pressure indicators during throttle advances will provide an indication of a system that is not operating properly per design specifications (reference STC SA2680SW Aircraft Flight Manual supplement for manifold pressure limits). Manual limiting of manifold pressure by throttle position can prevent an overboost condition in the event of inadequate overboost protection. Flight crews should report any overboost condition immediately and have a properly FAA certified mechanic resolve all defective conditions before further flight.

The FAA is preparing a Special Airworthiness Information Bulletin (SAIB) to notify owner/operators of Cessna 414 aircraft with STC SA2680SW installed of this safety condition.

AIR NOTES

ELECTRONIC VERSION OF MALFUNCTION OR DEFECT REPORT

One of the recent improvements to the Flight Standards Service Aviation Information Internet web site is the inclusion of FAA Form 8010-4, Malfunction or Defect Report. This web site is still under construction and further changes will be made; however, the site is now active, usable, and contains a great deal of information.

Various electronic versions of this form have been used in the past; however, this new electronic version is more user friendly and replaces all other versions. You can complete the form online and submit the information electronically. The form is used for all aircraft except certificated air carriers who are provided a different electronic form. The Internet address is: http://av-info.faa.gov/isdr/

When the page opens, select "M or D Submission Form" and, when complete, use the "Add Service Difficulty Report" button at the top left to send the form. Many of you have inquired about this service. It is now available, and we encourage everyone to use this format when submitting aviation, service-related information.

• Cylinder Miscount

In the July/August article on the FAA's DC3, I miscounted the number of cylinders that its R1830 engine has. The number of cylinders should have been 14, instead of nine. Thanks for making the correction.

Paul Turk
FAA, Office of Public Affairs

On July 15 Secretary of Transportation Norman Mineta and FAA Administrator Marion Blakely officially launched the N-34's Centennial of Flight tour in Washington, DC. The Aviation News staff attended and had a chance to see the engine up close and personal. We can honestly say that the engine does have 14 cylinders, not nine, and we have photos to prove it.

Louise Oertly photo

FAA AVIATION NEWS welcomes comments. We may edit letters for style and/or length. If we have more than one letter on the same topic, we will select one representative letter to publish. Because of our publishing schedules, responses may not appear for several issues. We do not print anonymous letters, but we do withhold names or send personal replies upon request. Readers are reminded that questions dealing with immediate FAA operational issues should be referred to their local Flight Standards District Office or Air Traffic facility. Send letters to H. Dean Chamberlain, FORUM Editor, FAA AVIATION NEWS, AFS-805, 800 Independence Ave., SW, Washington, DC 20591, or FAX them to (202) 267-9463; e-mail address:

Dean.Chamberlain@faa.gov

• A Magazine in Transition

In your January/February issue, the Editor's Runway was talking about changes coming to the *FAA Aviation News*. Where are they? I've been watching, but have seen nothing so far.

Lucas Manther
Via Internet

In the article, we mentioned that the magazine is now printed six times a year. This has been in effect since the September/October 2002 issue. We hope everyone is enjoying the additional information that the added pages are providing.

As for future changes in the magazine, this issue introduces design changes in the magazine—or to be more accurate on the cover of the magazine. Did anyone notice that our front cover sports a new look?

As always, we welcome your comments or suggestions. You can contact us electronically by means of the magazine's Internet Webmaster at <webmasteravnews@faa.gov>. Written comments can be sent to:

FAA Aviation News,
AFS-805
FAA, 800 Independence Ave. SW
Washington DC 20591.

SFAR 100, RELIEF FOR U.S. MILITARY AND CIVILIAN AIRMEN CERTIFICATION

On June 20, the FAA Issued a new Special Federal Aviation Regulation (SFAR) that allows Flight Standards District Offices (FSDO) to accept expired flight instructor certificates and inspection authorizations for renewals from U.S. military and civilian personnel who are assigned outside the United States in support of U.S. Armed Forces operations. This SFAR also allows FSDO's to accept expired airman written test reports for certain practical tests from U.S. military and civilian personnel who are assigned outside the United States in support of U.S. Armed Forces operations. This action is necessary to avoid penalizing U.S. military and civilian personnel who are unable to meet the regulatory time limits of their flight instructor certificate, inspection authorization, or airman written test report because they are serving outside the United States in support of U.S. Armed Forces operations. The effect of this action is to give U.S. military and civilian personnel who are assigned outside the United States in support of U.S. Armed Forces operations extra time to meet the certain eligibility requirements under the current rules. This SFAR expires on June 20, 2005.

ELT DEADLINE AND UPDATE

The January 1, 2004, deadline for certain turbojet-powered aircraft to start carrying emergency locator transmitters (ELT), as required by 14 Code of Federal Regulations (14 CFR) section 91.207, is rapidly approaching. Because of the pending deadline, *FAA Aviation News* checked with the National Oceanic and Atmospheric Administration's (NOAA) National Environmental Satellite, Data, and Information Service for the latest number of registered 406 MHz ELTs in its U.S. 406 Emergency Beacon Registration Database. According to NOAA, as of August 4, 2003, there are 3,647 registered 406 MHz ELTs in its database. The total number of registered 406 MHz beacons of all types in the database is 98,710.

Although any FAA-approved ELT will meet the pending 14 CFR section 91.207 carriage requirement, FAA recommends the carriage of 406 MHz ELTs because of the pending loss of satellite coverage of the older 121.5 MHz ELTs in 2009 and the many benefits the newer 406 MHz ELT design has over the older generation 121.5 MHz ELTs. Those 406 MHz ELT benefits include more transmitter power, digitally encoded aircraft/owner identification which helps the RCCs resolve false alerts, and prompt attention by NOAA and the RCCs to any 406 MHz distress alert.

If you install a 406 MHz ELT in your aircraft or you buy an aircraft with a 406 MHz ELT installed, it is important that the 406 MHz ELT be registered with NOAA as outlined in the data provided with a new ELT or as explained below. To help aircraft owners register their 406 MHz ELTs with NOAA, various FAA Headquarters Internet homepages provide a link to NOAA's 406 MHz ELT registration web site. For more information about NOAA, its 406 MHz beacon registration process, or the Cospas-Sarsat system, you can check NOAA's Search and Rescue Internet web site at <www.sarsat.noaa.gov>.

NOAA is the U.S. government agency that operates the U.S. Mission Control Center and represents the United States in the international satellite-based distress alerting system known as Cospas-Sarsat. As part of its system responsibilities, NOAA, with NASA support, provides both space and ground support as part of the U.S. contribution to the international distress alerting system based in London.

When a distress beacon, whether a marine, aviation, or personal, is detected by satellite in the U.S. area of responsibility, NOAA processes the alert and forwards the information to the appropriate authorities. In the United States, the U.S. Air Force Rescue Coordination Center (AFRCC) or one of the U.S. Coast Guard Rescue Coordination Centers (CGRCC) will be notified as appropriate. If you are not familiar with the National Search and Rescue Plan, the Air Force is responsible for inland search and rescue (SAR) and the Coast Guard is responsible for maritime SAR, including select waterways in the U.S.

As previously reported by this magazine, NOAA has announced the termination of the satellite-based alert monitoring of 121.5 MHz distress beacons in 2009 due in part to the high false alert rate of 121.5 MHz distress beacons. After that date, the satellite system will only monitor and process 406 MHz distress alerts.

For those who don't know about the 121.5 MHz false alert issue, according to NOAA about 99 percent of the 121.5 MHz distress alerts, maritime and aviation, received by NOAA are false alerts. Because of this high false alert rate, rescuers normally wait for either extra satellite passes over the alert area or some other verification of a real distress before activating a 121.5 MHz SAR response. This delay can mean hours before a SAR mission is initiated for a 121.5 MHz distress alert. In contrast, the response to a 406 MHz distress alert can be a matter of minutes. The key to this responsiveness is the 406 MHz beacon registration requirement. Since a 406 MHz beacon transmits its own unique digital identification code, the registered owner can be contacted for verification of an actual alert or asked to turn off a 406 MHz beacon transmitting false alert signal. Because of this quick verification capability of an actual emergency, SAR forces

can be quickly mobilized.

According to NOAA's web site, as of July 1, 2003, more than 15,000 people have been rescued worldwide in 1982 as a result of the Cospas-Sarsat system. That number includes 4,513 people rescued in the United States.

ONE OF OUR OWN

Normally we don't make announcements like this, but we would like to congratulate William (Bill) H. Wallace who works with us in Flight Standards' General Aviation and Commercial Division. He is the FAA's National Resource Specialist for Rotorcraft Operations and has been selected as a Fellow of the Royal Aeronautical Society. Based in London, the Royal Aeronautical Society is "the one multidisciplinary professional institution dedicated to the global aerospace community." The goals of the Society are to maintain the highest professional standards in all aerospace disciplines to provide a unique source of specialist information and forums for the exchange of ideas, and to exert influence in the interests of aerospace in both public and industrial arenas. Fellowship is the highest grade attainable and is only bestowed upon those who are either in a position of high responsibility or have made a significant contribution to aerospace.

WIDE AREA AUGMENTATION SYSTEM (WAAS) IS COMMISSIONED

On July 10, 2003, the FAA commissioned the latest satellite navigation system for instrument flight use. The Wide Area Augmentation System (WAAS) enhances the accuracy and reliability of the global positioning system (GPS) and transmits horizontal and vertical guidance capability. The commissioning of WAAS is the first step toward opening pilot access to more than 500 published satellite runway procedures at more than 200 U.S. airports.

Pending certification of avionics with vertical navigation capabilities and approval of individual approach procedures, pilots will be able to navigate as low as 350 feet above the runway end under instrument flight rules using satellite navigation to provide stable vertical guidance. Later this year, a new procedure will be published for the full capability of WAAS, resulting in approaches down to 250 feet above the runway.

FAA MAKES A WISH COME TRUE. Joey is like many other young boys who one day dream of making aviation his career. There is only one problem—Joey has brain cancer. With the approval of FAA's Eastern Region Office, the local Make-a-Wish Foundation arranged for Joey to spend the day at Long Island MacArthur Airport. The day included visiting the New York Automated Flight Service Station, the Long Island Tower, American Flyers Aviation School, and an U.S. Air Force facility.

"The global positioning system has provided tremendous safety benefits to the traveling public throughout most modes of transportation," said Secretary of Transportation Norman Y. Mineta. "Commissioning WAAS moves us closer to realizing the aviation potential of GPS and the precision it can add to the world's safest and most complex airspace system."

"Once avionics are certified to receive the system's full capability, WAAS will allow precision instrument approaches at thousands of runways at airports and airstrips that have little or no ground-based landing capability," said FAA Administrator Marion C. Blakey. "WAAS will also provide improved en route capabilities because pilots can fly more direct and shorter routes without depending on ground-based navigation aides."

United Parcel Service Aviation Technology and Chelton Flight Systems have received certification for WAAS avionics with horizontal navigation capability.

The equipment is available for the aviation community to purchase. Later this year, these avionics systems will be further certified to receive WAAS' vertical navigation capability. Several other manufacturers are currently working towards certification for WAAS receivers.

Also as a result of the announced WAAS commissioning, FAA in making changes to how it charts IFR procedures to certain airports. For complete details on the revised charting and flight and equipage requirements and operating limitations, pilots are advised to check the latest published *Notice to Airmen* (NOTAMS), and the latest *Aeronautical Information Manual* (AIM), and the chart legend in the front of each volume of the instrument approaches published by FAA.

Editor's Runway

from the pen of H. Dean Chamberlain

What have we learned?

As we prepare to celebrate the 100th anniversary of the Wright brothers' December 1903 first successful, controlled, powered flight in North Carolina, aviation from its earliest days has had its unique dangers and resulting fatal accidents as those early pilots and designers learned the secrets of flight. The price of uncovering those secrets was high. Many of aviation's early pioneers died learning critical lessons. It was as if Nature was extracting a price for revealing its long-held flight secrets.

As I write this article, the news media here in Washington is focusing on the Columbia Space Shuttle accident report due out today. The reason for mentioning the accident report is to use it as a lead into the question of what have we learned? In the last few days, I heard a brief discussion involving the Air Florida flight that crashed into the 14th Street Bridge across the Potomac River here in Washington in the early 1980's while taking off from the then Washington National Airport. The discussion was about what might the flight crew have done differently to have avoided the accident. I also heard a discussion about the commercial airliner years ago that lost part of its upper fuselage in Hawaii. That flight revealed new concerns about aircraft maintenance and aging aircraft.

Then last week, I sat in a meeting here in the Flight Standards General Aviation and Commercial Division with industry and FAA people discussing the future of flight training and testing. An important part of that discussion was how to prepare for the future changes in aviation, particularly, the changes in general aviation with its evolving "glass-cockpits" becoming standard in many of the new, smaller, technically advanced general aviation (GA) aircraft and the ongoing development of the small, lightweight "personal" jet aircraft and what type of training should be developed to ensure the safe operation of these "micro" jets.

General aviation is changing. The challenge today is can the industry and FAA keep ahead of the changing requirements by rethinking traditional flight training and testing methods? For example, scenario-based training is being recommended as one way to prepare new pilots for operations in the increasingly complex national airspace. In addition, FAA is looking at how scenario-based testing could be incorporated into the practical test standards (PTS). The problem with making any type of change in training and testing is the inherent delays and costs involved in any national training change. From establishing new FAA training methods and standards to revising the training materials to training the trainers and evaluators to measuring the effectiveness of those changes can take years. Add in the time and cost for the aviation industry to support those changes, and you can see why any change must be carefully thought out and analyzed for its cost versus benefit. Such a review can take years. However, with industry participation and support, FAA and industry working together can meet the challenge of tomorrow—today.

Since one of the major goals of the FAA is to prevent accidents, you can see the challenge facing FAA and the aviation industry as they study the past to learn how to prevent future problems. FAA and industry groups are working together to identify potential problems so they can develop strategies to prevent or reduce the impact of future problems and accidents. A good example of that team effort is the new FAA/Industry Training Standards (FITS) program. As explained in a recent three-part series in *FAA Aviation News*, FITS is one way the industry and FAA are working today to prepare for tomorrow.

The challenge as general aviation moves into its second century is being able to discover and in many cases, remember, the secrets of what we have learned from the past and apply that knowledge to the future without continuing to pay the price that many in the first century of flight paid for that knowledge. The secret is to learn from past accidents and use that knowledge to make the next century of flight as safe as possible. What have we learned? Time will tell.

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